ARTICLE 3: RESTRICTED ACTIVITIES

SECTION 3.01. Prohibition of Activities: Justification

Due to the potential hazard posed by anthropogenic activities to the City's PWS well(s) and, consequently, the health and safety of the general public, it is necessary to restrict activities in the WHPA(s) that may be a potential threat to the ground water quality.

SECTION 3.02. Activities to be Restricted

(1) The unauthorized disposal, placement, abandonment, or otherwise discharge (hereafter referred to as "dumping") of any material in a manner inconsistent with established City, State, or Federal ordinance, statute, or regulation is hereby prohibited. Examples of dumping include but are not limited to chemical waste, paint, mineral spirits, garbage, trash, sludge, automobiles, radioactive materials, and/or sewage/effluent.

(2) It shall be unlawful for any person, persons, firms or corporations to construct, install, or use any type of cesspool or septic tank on any property within the limits of the Wellhead Protection Areas of the City of _____, Texas, on and after the passage and adoption of this article.

(3) The City Council or its designated representative shall have the power to determine whether or not an activity is a potential source of contamination and should be prohibited or restricted based on the perceived threat to the City's public water supply system. This determination shall be based upon available knowledge and best professional judgment.

(4) The establishment or operation of landfills within the limits of the Wellhead Protection Areas.

(5) The disposal of used oil filters, oil, grease, or any other petroleum product capable of contaminating the public water supply anywhere within the city limits and ETJ.

(6) The transport, conveyance, storage, or disposal of hazardous, toxic, or other materials that may be an unreasonable threat to the public water supply systems within the Well head Protection Areas.

SECTION 3.03. Same — Sewage Plant, Drainage Ditch.

(1) The maintenance, construction, keeping or operation of any sewage treatment plant or sewage drainage ditch or stream or any sewage drainage of any sort or any type of irrigation or watering by means of sewage plant effluent within the distance of one thousand three hundred twenty (1,320) feet of any municipal water well or reservoir of the City, used for the purposes of supplying water to the water system of the City, is hereby declared to be unlawful and a public nuisance.

(2) Sewage treatment plants that exist and are in operation within one thousand three hundred twenty (1,320) feet of any municipal well or reservoir are hereby considered not considered to be in violation of this Ordinance. However, any substantial repair, modification, or improvement of such facilities shall fall under the jurisdiction of paragraph 1 of this Section.

SECTION 3.04. Same — Livestock.

The maintenance or keeping of any type or form of livestock or stock pen or cattle grazing or any similar activity within one thousand three hundred twenty (1,320) feet of any municipal water well or reservoir of the City, used for the purpose of supplying water to the water system of the City is hereby declared to be unlawful and a public nuisance.

SECTION 3.05. Penalty

Any person, firm, or corporation violating any provisions of this article shall upon conviction be fined in any sum of money not to exceed amounts stipulated in Article 5, Section 5.03; and each day of violation shall constitute a separate offense.

SECTION 3.06. Activities Imposing Immediate Threat; Abating Nuisance

Any activity located inside the wellhead protection area which, in the sole opinion of the City Council or its agents, presents an immediate threat and menace to the health, morals, safety or general welfare of the public is declared to be a nuisance. The City Council or its agents shall have the right to go on property upon which such activity(ies) is (are) situated and abate the nuisance in a temporary manner. Such activity shall thereafter be discontinued by the owner after the giving of required notice and in such manner that may be prescribed by the City Council. The

owner thereof shall be liable to the City Council for the cost of doing such temporary work under this Section and shall pay such cost upon demand.

SECTION 3.07. Exemptions

(1) Activities in effect before the adopted date of this ordinance shall not be affected retroactively. However, the City Council or its agents may require more stringent measures to minimize the threat of contamination.

(2) Activities carried out to comply with the Americans with Disabilities Act may be granted exemption status. Judgments shall be rendered on a case by case basis by the City Council upon appeal.

ARTICLE 4: GENERAL PROVISIONS

SECTION 4.01. Lands to Which This Ordinance Applies

The ordinance shall apply to all areas located within the designated WHPA(s) as adopted by the City Council. Article 2 shall apply to all areas within the City limits of _____, Texas and the areas outside the City limits which fall under the City's jurisdiction.

SECTION 4.02. Basis for Establishing the Wellhead Protection Area(s)

(1) The wellhead protection area(s) shall be delineated by the Texas Natural Resource Conservation Commission (TNRCC; or successor agency) using a site specific method stipulated in the Texas Wellhead Protection Program Description approved by the United States Environmental Protection Agency and will be based on a five (5) year time of travel.

(2) Information required for this delineation will include the maximum anticipated pumpage of each well in gallons per minute (GPM), the screened interval for each well, depth of each well, and additional information that is spelled out in the Texas Wellhead Protection Program Description. The respective wells shall be plotted on a City map and submitted to the TNRCC for delineation and compilation of a Wellhead Protection Report.

(3) An inventory of the WHPA(s) will be conducted by the local community, the results of which will be submitted to the TNRCC for inclusion in the report which will be presented to the community upon completion. The inventory shall be completed not later than ninety (90) days after the delineations were received by the city. The inventory results shall be submitted to the Wellhead Protection Coordinating Agency (TNRCC or successor) not later than thirty (30) days after the inventory was completed.

SECTION 4.03. Establishment of Permit

A permit governing construction, operation, correction, and abandonment of wells shall not impinge on existing permitting requirements currently in effect nor is it the intent of this ordinance to invalidate their purpose.

SECTION 4.04. Abrogation and Greater Restrictions

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and another conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

SECTION 4.05. Interpretation

In the interpretation and application of this ordinance, all provisions shall be; (1) considered as minimum requirements; (2) liberally construed in favor of the governing body; and (3) deemed neither to limit nor repeal any other powers granted under State statutes.

SECTION 4.06. Warning and Disclaimer of Liability

The degree of protection of the local community's PWS wells and public water supply is considered reasonable for regulatory purposes and is based on scientific and engineering considerations along with best professional judgment. It is recognized that not all potential sources of contamination are unavoidable and that a contamination event may occur due either to manmade or natural causes. This ordinance does not imply that the WHPA(s) will totally preclude a contamination event from taking place. This ordinance shall not create liability on the part of the community or any official or employee thereof for any damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

ARTICLE 5: ADMINISTRATION

SECTION 5.01. Designation of the Wellhead Protection Area Administrator

The _____ is hereby appointed the Wellhead Protection Area Administrator to administer and implement the provisions of this ordinance.

SECTION 5.02. Duties & Responsibilities of the Wellhead Protection Administrator

Duties and responsibilities of the Wellhead Protection Area Administrator shall include:

(1) Maintain and hold open for public inspection all records pertaining to the provisions of this ordinance.

(2) Review water well permit applications and other permit applications where applicable to determine whether the proposed activity in the WHPA will pose a threat to the integrity of the public water supply.

(3) Review, approve, or deny (or recommend denial where authority for denial is not granted) all applications for permits required by the adoption of this ordinance.

(4) Review permits for proposed development within the WHPA(s) to assure that all necessary permits have been obtained from those Federal, State, or local government agencies from which prior approval is required.

(5) Where interpretation is needed as to the exact location of the boundaries of the WHPA(s) (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the Wellhead Protection Administrator shall make the necessary interpretation.

(6) When a WHPA delineation has not been provided by the State (for example, upon completion of a new PWS well) the Administrator shall delineate a one-quarter mile radius around the well and administer it in accordance with this ordinance until such time as site specific determination can be made.

(A) An inventory of the WHPA around the proposed well shall be conducted prior to well construction pursuant to Section 290.41 of the 1992 Revised State Rules for Public Water Systems.

(B) Abandoned or inoperative water wells identified during the inventory shall be reported to the Commission prior to well construction or as required by the Commission.

(7) The WHPA Administrator shall coordinate the City's emergency response activities in the event a potential contamination event occurs.

(8) The WHPA Administrator shall also maintain an active list of potential sources of contamination which shows the physical location, street address, contact, and telephone number. This list shall be kept open for public inspection.

(A) The WHPA Administrator shall maintain a list of Regulated Businesses located within the City with their associated 4 digit Standard Classification Codes (SIC). This list shall be made available upon request and shall be on file with the City's Emergency Response Unit.

(B) The WHPA Administrator shall maintain a list of emergency telephone numbers for each of the Regulated Businesses. These numbers should be accessible 24 hours a day. These numbers shall be updated annually. In the event that a number changes or is no longer serviceable, the Regulated Business shall notify the City ten (10) business days before the anticipated changes occur. Failure to do so shall be deemed a violation of this ordinance.

SECTION 5.03. Noncompliance and Penalties

Persons and/or entities found to be in violation of this ordinance shall be notified by the City Council or its agent in writing. A person who violates any of the provisions of this ordinance is guilty of a misdemeanor and on conviction is punishable by a fine of not less than $10.00 nor more than $2,000.00. Each day that a violation occurs constitutes a separate offense.

SECTION 5.04. Variance Procedures

(1) The Appeal Board as established by the community shall hear and render judgment on requests for variances from the requirements of this ordinance.

(2) The Appeal Board shall hear and render judgment on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the Wellhead Protection Area Administrator in the enforcement or administration of this ordinance.

(3) Any person or persons aggrieved by the decision of the Appeal Board may appeal such decision in the courts of competent jurisdiction.

(4) No variance may be requested nor granted as a means to circumvent the intentions of this ordinance or as a remedy for a violation of this ordinance.

(5) The Wellhead Protection Area Administrator shall maintain a record of all actions involving an appeal.

(6) Upon consideration of the intent of this ordinance, the Appeal Board may attach such conditions to the granting of variances as it deems necessary to further the purpose and objectives of this ordinance.

(7) Prerequisites for granting variances:

a. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the potential threat of contamination of the PWS well and aquifer, to afford relief.

b. Variances shall only be issued upon;

(i) showing a good and sufficient cause;

(ii) a determination that failure to grant a variance would result in exceptional hardship to the applicant, and

(iii) a determination that the granting of a variance will not result in additional

threats to the public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances. (Note: economic circumstance does not qualify as an exceptional hardship).

c. Any application to whom a variance is granted shall be given written notice that the activity receiving this variance will decrease the travel time for potential contaminants to reach the PWS well and that any and all liability of a contamination event as a result of this activity receiving the variance is on the variance holder. Furthermore, the City, its officers and services, as well as its employees are released from any responsibility and liability for any damages and/or contamination events due to activity receiving the variance.

(8) Variances may be issued by a community for new development necessary for the conduct of the functionally dependent use provided that (i) the criteria outlined in this ordinance are met, and (ii) the development is protected by methods that minimize the risk of a contamination event and creates no additional threats to public safety.

ARTICLE 6: HEADINGS

The headings to sections contained in this ordinance are for convenience and reference only and in no way define, describe, extend or limit the scope or intent of the substantive provision to which the heading applies unless the context so requires.

ARTICLE 7: ORDER OF PREFERENCE

Unless otherwise stated, a listing of factors, criteria or subjects in the ordinance does not constitute an order of preference.

ARTICLE 8: SEVERABILITY

If any provision of this ordinance is held invalid, such invalidation shall not affect any other provision which can be given effect without the invalid provision, and to this end the provisions of this ordinance are declared to be severable.

CERTIFICATION

It is hereby found and declared by _____
(local entity)

that the wellhead protection area(s) (WHPA(s)) located within the corporate boundaries and/or extraterritorial jurisdiction have been recognized and are adopted as a means to protecting _____ drinking water supply; that contamination of the wells and subsequently the aquifer from which the water is drawn would result in excessive public expenditures, endanger the lives and health of the public, threaten commerce, and damage public utilities; in order to effectively comply with the Chapter 26.177 of the Texas Water Code; and in order to effectively remedy the situation described herein, it is necessary that this ordnance become effective immediately.

Therefore, an emergency is hereby declared to exist, and this ordnance, being necessary for the immediate preservation of the public peace, health and safety, shall be in full force and effect from and after its passage and approval.

APPROVED; _____
(community official)

PASSED: _____,19___ A.D.
(date)

I, the undersigned, _____, do hereby certify that the above is a true and correct copy of an ordinance duly adopted by the _____, at a regular meeting duly convened on _____, 19___ A.D..

_____ (SEAL)
(Secretary or responsible person)

The following is a sample ordinance relating to the development of overlay zones for groundwater protection. (excerpted from Community Planning and Zoning for Groundwater Protection in Michigan) This excerpt contains background information and sample ordinance language for a wellhead protection overlay zone - which is one way an overlay zone could be used to protect groundwater resources. The sample ordinance language will need to be supplemented based on local circumstances to satisfactorily achieve its intended purpose.

MICHIGAN WELLHEAD PROTECTION OVERLAY ZONE

STATE OF MICHIGAN WELLHEAD PROTECTION PROGRAM REQUIREMENTS

Wellhead protection for public water supply wells is required by the federal Safe Drinking Water Act. All public water suppliers which use groundwater, including municipalities which own and operate public water systems, are covered by the federal requirements.

The Michigan Department of Natural Resources and the Michigan Department of Pubic Health, working as co-lead agencies, will submit a Michigan Wellhead Protection Program for review and approval by the U.S. Environmental Protection Agency. Because land use controls at the local level are a key for effective wellhead protection, local government initiatives for wellhead protection are viewed as extremely important.

The Michigan Wellhead Protection Program will reflect federal requirements. The following elements will be identified for each public groundwater system:

- Roles and duties of state and local governments and public water suppliers;
- Delineation of the wellhead protection area (WHPA), based on reasonably available hydrogeologic and other information;
- Identification of contaminant sources within each WHPA, including all potential sources that may have an adverse health impact;
- Management approaches which may include technical assistance, financial assistance, implementation control measures, education, training, and demonstration projects;
- Contingency plans for each public water supply system, indicating the location of alternate drinking water supplies;
- Proper siting of new wells to maximize yield and minimize potential contamination; and
- Public participation.

The Wellhead Protection Area (WHPA) can be all or part of the zone of contribution where

infiltration (and contaminants) flow directly to the municipal well. The delineation of the WHPA will be made in accordance with criteria set by state agencies. Under the proposed Michigan approach, local governments which own and operate water supply facilities will prepare wellhead protection plans for review and approval by state agencies.

Land Use and Regulatory Controls Within Wellhead Protection Areas

Local governments preparing wellhead protection plans will need to demonstrate to state agency representatives that they are adequately protecting the public water supply from potential new or expanded sources of contamination. A source of contamination may be an existing land use or a new or expanded land use. As a result of the range of potential contamination sources, a combination of ordinances and regulatory tools may be needed to provide necessary wellhead protection. In most cases, a complete local wellhead protection program will need to provide for:

- Land use controls of new or expanded uses; and
- Inspections of existing facilities to assure compliance with regulatory standards.

These regulatory needs may be met through municipal regulation by counties (with zoning ordinances), townships, villages and cities. County health department regulations may also provide important tools. In some cases, a combination of local and county regulations may be effective.

Several major regulatory options for Michigan communities include the following:

- A wellhead protection overlay zoning district, designed to regulate new or expanded land uses within the designated WHPA. The overlay district would require special use permits and maintenance agreements when new or expanded land uses are reviewed. Special use review fees would help cover the cost of administration.

- A police power ordinance for wellhead protection, involving a use permit for existing and new uses on an annual basis. Fees could be charged to all uses within the WHPA to pay for the cost of administration, inspections, and enforcement. Although many standards would be similar to a zoning ordinance, a wellhead protection ordinance would not be limited to new uses.

- Local fire code amendments directed toward the control of hazardous substances in the designated WHPA. Local fire codes presently provide authority to review new plans and

complete inspections for fire safety purposes. Some amendments are usually needed to provide regulatory authority for groundwater protection purposes.

- A county hazardous substances ordinance with review standards for new uses and existing uses. The Washtenaw County Right to Know regulations (administered by environmental health professionals) and the City of Novi Hazardous Chemicals Ordinance (administered by the City's fire marshal) provide useful examples of the types of regulatory activities which are possible. (Note: a community-wide hazardous substances ordinance could also be adopted and administered by a city, village, or township with professional staff and strong administrative capabilities.)

The evaluation of these options and selection of a management program approach will vary among local communities, reflecting the fact that the vulnerability of the resource, potential land use threats, and administrative resources vary considerably.

Wellhead Protection Overlay Zoning District

A wellhead protection overlay zoning district could be incorporated into a local zoning ordinance. The elements of the sample wellhead protection overlay district are based on the following:

- The special use approval process is a regulatory tool particularly useful to the task of wellhead protection. Special use standards and an approval process give local governments the right to deny a land use, even when the proposed land use is similar in type to neighboring land uses provided it does not meet existing ordinance standards. Site plans must be submitted for review and approval in accordance with special use standards. This approach is stronger than site plan review alone.

- Authorization of special land uses within a wellhead protection district can be conditioned on approval of a maintenance agreement for landscaping, prevention of leaks and spills, maintenance of hazardous substance storage facilities, and other factors. The maintenance agreement (similar to stormwater facility maintenance agreements) would be filed with the Register of Deeds and would apply to all future land owners.

- A wide range of land uses potentially can contaminate groundwater, and should be regulated for wellhead protection purposes.

A basic outline of a wellhead protection overlay zoning district is presented below. The particular details should be developed as part of the process of preparing a Wellhead Protection Plan for a particular community.

◆◆◆◆◆◆◆◆◆◆

Sample Ordinance Language - To be expanded through a local Wellhead Protection Program, including the review and state-level approval of a Wellhead Protection Plan.

Statement of Purpose

The intent of the wellhead Protection Overlay Zone is to provide supplemental development regulation in the designated area so as to permanently protect the _____(name of community) drinking water source from long-term contamination originating from land use activities on the earth's surface. Due to the vulnerability of groundwater to contamination, the need for public health protection, and the significant public investment in the municipal water supply system, these regulations contain protective measures which do not apply to other areas of the community.

Definitions

(to be added as appropriate and to fit existing ordinance definitions)

Application to Land Use Activities

The requirements of this section (or chapter) apply to any person, firm, or corporation within the wellhead protection overlay zone when new or expanded land uses are proposed.

Special Land Use Permit Required

No land uses within the wellhead protection overlay zone subject to regulation under this ordinance shall be constructed or expanded unless a special use permit has been granted by the planning commission (or zoning board, an official charged with administering the ordinance, or the governing body - specify as appropriate).

Wellhead Protection Area Map

The wellhead protection overlay zone shall be mapped and the land area where water infiltrates into the soils and reaches groundwater used by the public water supply wells shall be delineated. The wellhead protection overlay zone map shall indicate the criteria and methods used to prepare the map and shall be periodically reviewed. The wellhead protection overlay zone map is incorporated into this zoning district regulation.

Wastewater Treatment System Connections

All land uses within the wellhead protection overlay zone shall be connected to available public wastewater treatment facilities.

Site Plan Review Requirements

All land uses proposed or expanded within the wellhead protection area shall meet the site plan review standards specified in section ____ of the zoning ordinance.

Data Submission Requirements

Data required for special land use review purposes includes the following:

1. Listing of types and quantities of hazardous substances which will be used or stored on site at the facility in quantities greater than 25 gallons per month.
2. Completion of the "Hazardous Substances Reporting Form", as provided by the zoning administrator (or *clerk, if appropriate).*
3. Location of existing and proposed service facilities and structures, above and below ground, including:
   a. General location of the site within the wellhead protection area.
   b. Septic systems, drainfields, and other wastewater treatment systems to be used by the facility.
   c. Areas to be used for the storage, use, loading/unloading, recycling, or disposal of hazardous substances, including interior and exterior areas.
   d. Underground storage tank locations.
   e. Location of exterior drains, dry wells, catch basins, retention/detention areas, sumps and other facilities designed to collect, store or transport storm water or wastewater. The point of discharge for all drains and pipes shall be specified on the site plan.
4. Location of existing wetlands and watercourses, including lakes, ponds, rivers and streams on or within 1/4 mile of the site.
5. Soil characteristics of the site, at least to the detail provided by the U.S. Soil Conservation Service.
6. Existing topography, with a maximum contour interval of two (2) feet indicated.
7. Delineation of areas on the site which are known or suspected to be contaminated, together with a report on the status of site cleanup.
8. An affidavit stating that any existing facility is in compliance with county, state and federal regulations.
9. A county/state environmental permits checklist, indicating the types of environmental

permits and approvals which may be needed for the proposed project.

Standards for Special Land Uses

All projects proposed for special land use approval within the wellhead protection area shall meet the following minimum standards:

1. Sites at which hazardous substances are stored, used or generated shall be designed to prevent spills and discharges to the air, surface of the ground, groundwater, lakes, streams, rivers, or wetlands.
2. Secondary containment of hazardous substances shall be provided for areas where such substances are stored or used. Secondary containment shall be sufficient to store the substance for the maximum anticipated period of time necessary for the recovery of any released substance.
3. General purpose floor drains shall be approved for connection to a public sewer system, an on-site holding tank, or a system authorized through a state groundwater discharge permit.
4. State and federal agency requirements for storage, spill prevention, record keeping, emergency response, transport and disposal of hazardous substances shall be met including but not limited to the following:
   a. A Michigan Groundwater Discharge Permit shall be required for any discharge to groundwater.
   b. A Pollution Incident Prevention Plan shall be prepared by facilities which store any quantity of materials listed on the Michigan Critical Materials list.
5. Commercial or industrial land uses shall have specially-designed storm water facilities in areas where hazardous substance spills may occur. Such facilities shall be designed to:
   a. Prevent the commingling of storm water runoff and hazardous substances;
   b. Enhance spill cleanup procedures; and
   c. Meet all county, state and federal agency requirements.
6. All guidelines and requirements of federal, state, county and local agencies specified in the state-approved wellhead protection plan for _____(name of community) shall be met. (Note: the guidelines specified in the wellhead protection plan could include: underground storage tank requirements which duplicate or exceed requirements of the State Police Fire Marshal Division; septic system density requirements which duplicate or exceed the county sanitary code; additional secondary containment and spill prevention measures which are developed through the wellhead protection program.)

Maintenance Plan Required

All special land uses proposed for the wellhead protection area shall have an approved maintenance plan recorded with the county register of deeds. The maintenance plan may include standards and operational requirements related to:

1. The application rate and timing of lawn fertilizers;
2. The pumpout and operation of on-site septic systems;
3. The repair and reconstruction of secondary containment dikes and other spill protection measures;
4. The application of de-icing chemicals to road surfaces and parking lots;
5. Maintenance of storm water management facilities located on-site; and
6. Other topics identified in the _____ (name of community) Wellhead Protection Plan.

Administrative Review Fees

All applicants for special use permits shall pay an administrative fee sufficient to cover the expense of reviewing and approving the proposal, including, but not limited to, the cost of planning and engineering site reviews.

Standards for Land Use Activities

(If there are any existing land use activities within the boundaries of the overlay zone which pose special threats to groundwater from expansion or if there are future land uses permitted in the underlying district which pose special threats, then it may be pertinent to add language here for those particular land uses.

The following is an wellhead protection plan using overlay zoning developed for Portage County, Wisconsin. This appendix includes possible language for a groundwater-protection overlay district developed by the Portage County Planning Department (1987) for incorporation into the Portage County Zoning Ordinance. It illustrates one local government's approach to wellhead protection. It is not intended to be a model elsewhere without careful consideration of local conditions.

PORTAGE COUNTY, WISCONSIN WELLHEAD-PROTECTION ORDINANCE

Groundwater protection overlay district

6.7.1. Purpose

The County Board of Portage County recognizes that the people of Portage County depend exclusively on groundwater for a safe drinking water supply and that certain land uses in the Portage County environmental setting can seriously degrade water quality. Therefore, the designated best use of the unconfined groundwater of Portage County is for public and private water supply and it is the policy of the County to maintain its groundwater resources as near to the natural condition of purity as reasonably possible for the safeguarding of the public health, safety, and welfare.

The purpose of the Groundwater Protection Overlay District is to protect key groundwater recharge areas by imposing appropriate land-use restrictions in these areas. Wisconsin Act 410, 1983, specifically includes groundwater protection among the purposes for which local zoning power may be exercised. The restrictions included herein are in addition to those of the underlying zoning districts or any other provisions of the zoning or other County ordinance.

6.7.2. Designation of municipal or private well field groundwater protection zones

The boundaries for the groundwater recharge protection zones for the Groundwater Protection Overlay District are as shown on the map "Groundwater Protection Districts for Portage County Well Fields" dated _____. [See fig. A1 for examples of proposed wellhead-protection zones for Whiting well field.]

Said map is hereby adopted by reference becoming a part of this ordinance as if the map were fully described herein. The groundwater recharge basins for the designated well fields are divided into three zones reflecting the potential for land-use activities to adversely impact the well fields and the subsequent scope of land-use restrictions needed.

6.7.3. Zone A — Groundwater protection overlay district

A. Intent. Zone A is the immediate area around the well field, commonly known as the cone of depression, in which groundwater elevations are lowered by pumping. This area is subject to the highest contaminant threat, and therefore, the land use restrictions are the most severe of the recharge zones.

B. Uses. The following uses are permitted:

1. Parks/playgrounds.
2. Archery ranges.
3. Boat landings.
4. Other natural uses -

   wildlife areas

   wild crops

   non-motor trails (bike, skiing, nature, fitness)

   hunting/fishing/trapping.

C. Special Exception Uses. The following uses are permitted upon proper application as provided in this ordinance, particularly items (a) and (b) of Subparagraph 6.6.2(A)(3), only after such use shall have been approved in writing by the Board of Adjustment, after public hearing. Such approval shall be consistent with the general purpose and intent of this ordinance and shall be based upon evidence as may be presented at such public hearing, tending to show the desirability of specific uses from the standpoint of the public interest because of such factors as (without limitation because of enumeration) groundwater pollution, smoke, dust, noxious or toxic gases and odors, noise, glare, vibration, operation of heavy machinery, heavy vehicular traffic, increased traffic on the streets and other safety and health factors; such uses shall meet the specific conditions attached below and such other conditions as the Board of Adjustment deems necessary in furthering the purpose of this ordinance.

1. Residential.
2. Fishery production facility.
3. Forestry plantations.
4. Campgrounds.

D. Prohibited Uses. The following uses are expressly prohibited in this zone:
All uses not permitted or special exception in this section.

E. Performance Standards. The following standards apply to all uses in Zone A of the Groundwater Protection Overlay District.

1. On-site sanitary system with any type of discharge—Prohibited. Municipal sewer required.
2. Underground tanks—Prohibited.

3. Natural vegetation not treated with fertilizers and pesticides—A minimum of 85% of lot must be retained in natural vegetation.
4. Lot size—2 acres per residential unit with municipal sewer. Multiple family units and cluster developments may increase density by 50% if restrictive covenant maintains natural vegetation requirement.
5. Pesticide/fertilizer storage and use (including septage and sludge land spreading)—Prohibited except for normal home use and by special case-by-case review.
6. Animal waste facility or land spreading—Prohibited.
7. Stormwater and drain discharge—Direct subsurface drainage prohibited. Discharge of hazardous materials prohibited. All surface runoff and drain construction must provide a means for collection or containment in the event of a hazardous materials spill.
8. Salt storage—Prohibited.
9. Hazardous/toxic materials storage and use—Prohibited except for normal home use.
10. Hazardous/toxic wastes—On-site treatment, transfer, or disposal prohibited.

6.7.4. Zone B — Groundwater protection Overlay district

A Intent. Zone B is the recharge area upgradient of Zone A to the point where it is estimated that groundwater and contaminants will take 5 years to reach the pumping well(s). This is an intermediate zone and land use measures are slightly less restrictive than Zone A because of the longer flow times and greater contaminant dilution and attenuation potential.

B. Uses. The following uses are permitted:

1. Residential.
2. Parks/playgrounds.
3. Shooting ranges.
4. Boat landings.
5. Campgrounds.
6. Natural uses -
   - wildlife areas
   - wild crops
   - non-motor trails (bike, skiing, nature, fitness)
   - hunting/fishing/trapping.

C. Special Exception Uses. The following uses are permitted upon proper application as provided in this ordinance, particularly items (a) and (b) of Subparagraph 6.6.2(A)(3), only after such use shall have been approved in writing by the Board of Adjustment, after public hearing. Such approval shall be consistent with the general purpose and intent of this ordinance and shall be based upon evidence as may be presented at such public hearing, tending to show the desirability of specific uses from the standpoint of the public interest because of such factors as (without limitation because of enumeration) groundwater pollution, smoke, dust, noxious or toxic gases and odors, noise, glare, vibration, operation of heavy machinery, heavy vehicular traffic, increased traffic on the streets and other safety and health factors; such uses shall be required to conform with the plan approved by the Board of Adjustment and shall meet the

specific conditions attached below and such other conditions as the Board of Adjustment deems necessary in furthering the purpose of this ordinance.

1. All uses not permitted or prohibited in this section.

D. Prohibited Uses. The following uses are expressly prohibited in this zone:

1. Landfills.
2. Feedlots.
3. Wastewater treatment facilities.
4. Junkyards.
5. Gas stations/garages.
6. Toxic/hazardous waste facilities.
7. Radioactive waste facilities.
8. Bulk fertilizer/pesticide facilities.
9. Asphalt products manufacturing.
10. Chemical manufacture/storage/sale.
11. Dry cleaning facilities.
12. Electroplating facilities.
13. Exterminating shops.
14. Paint/coating manufacturing.
15. Printing/publishing facilities.
16. All uses requiring use or storage of hazardous or toxic materials.

E. Performance Standards. The following standards apply to all uses in Zone B of the Groundwater Protection Overlay District.

1. On-site sanitary system with any type of discharge—For residential use: One system per 5 acres; for other uses: 75 gal per acre per day.
2. Underground tanks—Tanks less than 500 gal are prohibited; other tank installations require monitoring wells, overflow prevention, corrosion-resistant construction, monthly reports and inspections, and spill/ leak contingency plan.
3. Natural vegetation not treated with fertilizers and pesticides—A minimum of 80% of lots with on-site sewage disposal must be retained in natural vegetation. A minimum of 60% of lots with municipal sewer must be retained in natural vegetation.
4. Lot size for residential uses—1 acre per unit with municipal sewer, or 5 acres with on-site sewage disposal. Multiple family and cluster developments may increase density by 50% if restrictive covenant maintains natural vegetation requirement in sewered areas or increases area of natural vegetation by 10% over minimum requirement in unsewered areas.
5. Lot size for other uses—1 acre minimum subject to (1) above.
6. Pesticide/fertilizer storage and use (including septage and sludge land spreading)—Prohibited except for normal home use or where an agricultural best-management practices plan approved by the county Land Conservation Department guides usage.
7. Animal waste facility or land spreading—Waste facilities must be permitted under the Portage County Animal Waste Management Ordinance. A best-management practices plan must be approved by the County Land Conservation Department for land spreading.

8. Stormwater and drain discharge—Direct subsurface drainage prohibited. Discharge of hazardous materials prohibited. All surface runoff and drain construction must provide a means for collection or containment in the event of a hazardous materials spill.
9. Salt storage—Prohibited.
10. Hazardous/toxic materials storage and use—Prohibited except for normal home use (also see 6 above).
11. Hazardous/toxic wastes—On-site treatment, transfer, or disposal prohibited.

6.7.5. Zone C - Groundwater protection overlay district

A. Intent. Zone C is the remainder of the recharge basin upgradient of Zone B, and includes surface water basins that may contribute to well recharge. Management measures are the least restrictive of the recharge zones.

B. Uses. The following uses are permitted uses:

1. All uses not prohibited or special exception in this section.

C. Special Exception Uses. The following uses are permitted upon proper application as provided in this ordinance, particularly items (a) and (b) of Subparagraph 6.6.2(A)(3), only after such use shall have been approved in writing by the Board of Adjustment, after public hearing. Such approval shall be consistent with the general purpose and intent of this ordinance and shall be based upon evidence as may be presented at such public hearing, tending to show the desirability of specific uses from the standpoint of the public interest because of such factors as (without limitation because of enumeration) groundwater pollution, smoke, dust, noxious or toxic gases and odors, noise, glare, vibration, operation of heavy machinery, heavy vehicular traffic, increased traffic on the streets and other safety and health factors; such uses shall be required to conform with the plan approved by the Board of Adjustment and shall meet the specific conditions attached below and such other conditions as the Board of Adjustment deems necessary in furthering the purpose of this ordinance.

1. Landfills
2. Feedlots
3. Wastewater treatment facilities
4. Junkyards.
5. Gas stations/garages
6. Bulk fertilizer/pesticide facilities.
7. Asphalt products manufacture
8. Chemical manufacture/storage/sale
9. Dry cleaning facilities
10. Electroplating facilities
11. Exterminating shops
12. Paint/coatings manufacturing
13. Printing/publishing facilities
14. Septage/sludge land spreading.
15. Animal waste facilities
16. Spray wastewater facilities

D. Prohibited Uses. The following uses are prohibited in this zone:

1. Toxic waste facilities.
2. Radioactive waste facilities.

E. Performance Standards. The following standards apply to all uses in Zone C of the Groundwater Protection Overlay District.

1. On-site sanitary system with any type of discharge—For residential use: one system per 2 acres; for other uses: 200 gal per acre per day.
2. Underground tanks—Tank installations require overflow prevention, corrosion resistant construction, monthly reports and inspections, and spill/leak contingency plan.
3. Natural vegetation not treated with fertilizers and pesticides—A minimum of 65% of all lots must be retained in natural vegetation.
4. Lot size for residential—2 acres per unit with on-site sewage disposal. Multiple family and cluster developments may increase density by 50% if restrictive covenant increases area of natural vegetation by 10% over minimum requirement.
5. Lot size for other uses—1 acre minimum subject to (1) above.
6. Pesticide/fertilizer storage and use (including septage and sludge land spreading)—Bulk storage facilities must include groundwater monitoring and reporting as determined by the County Community Human Services Department. Agricultural best-management practices strongly encouraged.
7. Animal waste facility or land spreading—Waste facilities must be permitted under the Portage County Animal Waste Management Ordinance. Agricultural best management practices for land spreading strongly encouraged.
8. Stormwater and drain discharge—Direct subsurface drainage prohibited except for special case-by-case review and approval with groundwater monitoring. Discharge of hazardous materials prohibited.
9. Salt storage—Groundwater monitoring required as determined by the County Community Human Services Department.
10. Hazardous/toxic materials storage and use—Site plan review required, including description of all materials, operational practices to prevent groundwater contamination, contingency plan for accidental discharges, and a proposed disposal plan for anticipated wastes. Best-management practices encouraged.
11. Hazardous/toxic wastes — On-site treatment, transfer, or disposal prohibited

◆◆◆◆◆◆◆◆◆◆

Addition to Section 6.6.3(B) Boundaries of Districts:

The boundaries of the Groundwater Protection Overlay District shall be as shown on the map "Groundwater Protection Districts for Portage County Well Fields," dated_____. Boundary determinations for specific properties shall be made by the Zoning Administrator by scaling distances from this map. Appeals to this determination shall be made to the Board of Adjustment as provided in Section 6.6.5(C), and shall be supported with appropriate technical documentation as determined by the Board of Adjustment. Such documentation shall generally be a hydrogeologic study by a qualified professional that indicates the property in question is out of the designated groundwater recharge area or should be classified in a different recharge area zone.

Additions to Section 6.6.10 Definitions:

Aquifer—*A* saturated permeable geologic formation that contains and will yield significant quantities of water.

Recharge area—*The* total area relative to a point of groundwater use in which water falling on or discharging to the ground may move via ground or surface waters to that point of use.

Cone of depression—*A* roughly conical concavity (or dimple) in the water table (unconfined aquifer) around a pumping well.

Hazardous/toxic substance—*Any* substance which is ignitable, corrosive, acute hazardous, reactive, EPA toxic, or toxic as defined in the State Code NR 181.

The following is a sample ordinance that was developed in Michigan describing site plan review as a potential option for groundwater protection. (excerpted from Community Planning and Zoning for Groundwater Protection in Michigan)

MICHIGAN SITE PLAN REVIEW STANDARDS

Background: Zoning Ordinance Requirements for Site Plan Review

Site plan review is an administrative process for controlling land use development which is specifically allowed in Michigan's zoning enabling statutes. Through site plan review, local officials review the proposed land use project and compare the site plan map and other documents with standards contained in the local zoning ordinance.

As defined in state laws, the site plan includes: "documents and drawings specified in the zoning ordinance necessary to insure that a proposed land use or activity is in compliance with the local ordinances and state and federal statutes."

The zoning ordinance must list the types of mapped data and other information which the applicant should provide. The zoning ordinance must also include the standards against which the proposed site plan will be judged.

If the proposed site plan meets the standards in the zoning ordinance, the plan must be approved. Site plan review standards, therefore, provide the basis upon which questions can be proposed to applicants, as well as the framework for requiring certain on-site measures and practices for groundwater protection.

Once approved, the site plan is an enforceable document. Site plans can only be changed with the mutual consent of the property owner and the approving zoning body.

Standards for site plan review may be contained in a special section of the zoning ordinance or in the sections for certain zones (such as an M-1 manufacturing district or a C-3 commercial district). Because groundwater protection standards apply to a wide range of commercial and industrial uses, and, in some cases, to residential uses, it is usually helpful to incorporate the standards into a special section of the zoning ordinance which cross references their applicability to particular land use zones.

A useful site plan review process will enable the planning commission to review a wide range of topics relevant to a particular site plan. The initial zoning review addresses only the question of land use - that is, the type of residential, commercial, industrial, or other use - and the conformance of the proposed land use with the zoning district established by ordinance. The site plan review process allows the planning commission to review aspects of the proposal related to physical aspects of the site, including the layout of the building and infrastructure.

Definitions for Site Plan Review

Because several different federal and state laws reference hazardous substances, hazardous chemicals, and hazardous waste, and because regulatory thresholds vary among state and federal laws, local zoning ordinances should define the type of facilities subject to regulation through definitions and other pertinent sections of the zoning ordinance.

For local governments in Michigan who elect to use a site plan review process for groundwater protection purposes, the following ordinance definition is recommended:

> **Hazardous substances:** A chemical or other material which is or may be injurious to the public health, safety, or welfare or the environment.

This definition is quoted from the Michigan Environmental Response Act (Act 307 of 1982), Michigan's contamination site identification and cleanup statute. This broad wording helps local governments avoid the numerous lists and complicated chemical definitions which state and federal regulatory programs use. The definition listed above is very broad and inclusive; an approach which meshes with the reality that many types of materials and substances can cause groundwater contamination if mishandled or allowed to reach water bodies.

It is recommended that any facility which uses, stores or generates hazardous substances in quantities greater than 100 kilograms per month (equal to about 25 gallons or 220 pounds) be subject to local groundwater protection requirements. This threshold is low, reflecting the fact that very small quantities of hazardous chemicals have contaminated groundwater in Michigan. The threshold of 100 kilograms is incorporated in federal regulations for the Resource Conservation and Recovery Act (RCRA).

By using the 100 kilogram threshold, facilities which have very small amounts of cleaning products or a few cans of oil-based paints would not be subject to regulation. Any facility which used a drum of oils, solvents, or other chemicals, however, would be subject to regulation.

The actual quantities of hazardous substances used at most business facilities vary from time to time. The low threshold allows for local government regulation without the necessity for extensive inventories at the site plan review stage.

Data Requirements and Standards for Site Plan Review

Site plan review standards should be as specific as the subject matter allows, reflecting the best technical expertise to accomplish the public purpose. For groundwater protection, care must be taken in constructing standards and related data submission requirements. In addition to referencing groundwater protection measures which are useful, the standards must fit appropriately with state statutes and regulatory programs. The standards should avoid unnecessary data collection while providing direction for the reviewer.

The standards recommended here are similar to standards developed by the Clinton River Watershed Council in 1986 for technical assistance work with Oakland and Macomb County local governments. For purposes of statewide use, the standards and definitions, including some updating, were reviewed with representatives from the Waste Management Division, Michigan Department of Natural Resources and county agency groundwater compliance inspectors. A complete description of the technical basis for the standards is included.

Data Submission By the Applicant

Because groundwater protection is a relatively new topic for local planning, it is essential that site designers, engineers and property owners have specific guidance concerning the data to display on the site plan map, as well as supportive written information. It is recommended that the following information, at a minimum, be obtained from the land owner:

- Proposed location of best management practices and measures for groundwater protection, such as secondary containment storage areas.
- Structural features which can affect the flow of hazardous substances to groundwater, such as interior floor drains, exterior storm drain inlets and outlets, underground storage tanks, etc.
- Location of natural resource features (such as lakes, streams and wetlands) and drinking water well locations on and near the property.

Submission of well log information is not recommended, since it is costly and difficult to interpret by local officials for groundwater protection purposes.

Hazardous Substance Reporting Form

As a supplement to mapped data, the completion and submission of the two-page "*Hazardous Substances Report Form for Site Plan Review*" is recommended. The form provides the

planning commission with information about site features which are related to state and federal regulatory compliance (Part I of the form). The form also provides an easy way to record hazardous substances proposed for use at the facility (Part II of the form). The Hazardous Substances Reporting Form should be submitted at the time that site plan drawings are submitted.

The use of the State/County Environmental Permits Checklist is also recommended for use during the site plan review process.

Site Plan Review Standards

Site plan review standards should be written to be as specific as the subject matter allows. The word "groundwater" should be referenced in the zoning ordinance, and the site plan review standards should serve to inform the applicant about the community's approach and requirements for groundwater protection.

Some communities, for example, include a very broad zoning ordinance standard which references elements of the site being "harmoniously designed in relation to topography, type of land, and natural resources". For groundwater protection purposes, it is both possible and necessary to write more specific standards.

The following items, at a minimum, should be referenced in site plan review standards for groundwater protection:

- Site design to prevent spills and discharges to the environment and groundwater;
- Secondary containment for hazardous substance storage and use areas;
- General purpose floor drains are only allowed if approved for connection to a public sewer system, an on-site closed holding tank (not a septic system), or a state groundwater discharge permit;
- Compliance with state and federal requirements for hazardous substances, safety and environmental protection.

Stormwater management is a topic separate from groundwater pollution prevention. Nevertheless, when a site plan is reviewed, both stormwater runoff facilities and hazardous substance questions should be reviewed together. Stormwater drainage facilities should not increase the potential for groundwater pollution, and the site plan process allows for the type of comprehensive oversight which is important for addressing this concern. In order to allow for this oversight, stormwater facilities and hazardous substance facilities should be indicated on the site plan. The standards and site practices for stormwater management should be separate from groundwater protection.

Stormwater management and groundwater protection measures and facilities can be used to protect both surface and groundwater resources. A multi-purpose, water resource protection approach to site plan review is strongly recommended, especially for communities with limited staff and financial resources.

Conditional Approval of Site Plans

Conditions on approval of the site plan may be imposed if the conditions meet the requirements specified in the zoning enabling acts. Conditions must be:

- Designed to protect natural resources, and the health, safety, and welfare and the social and economic well-being of residents, neighbors, and the community as a whole:
- Related to the valid exercise of the police power;
- Necessary to meet the purposes of the zoning ordinance and related to the standards established in the zoning ordinance for the land use or activity under consideration.

The following two conditions are examples of typical conditions for groundwater protection:

- Site plan approval is conditioned upon the provision of secondary containment structures for hazardous substance storage no later than _____ (specify date).
- Site plan approval is conditioned upon the approval of the facility's Pollution Incident Prevention Plan by the Michigan Department of Natural Resources.

Inspections after construction of the facility are often needed to assure that the site plan has been carried out in accordance with the approved plan. In some communities, building inspectors or fire officials complete the follow-up administrative inspections to assure that site plan review requirements and conditions are met.

Experience of Michigan Municipalities to Date

For the past three years, the Clinton River Watershed Council (Oakland and Macomb Counties) has worked with local governments to Incorporate groundwater protection into the local site plan review process. Experience with site plan review in Southeast Michigan is substantial, and some local governments have found it useful to amend their ordinances.

In addition, the City of Aubum Hills has incorporated the equivalent of groundwater protection standards (with an emphasis on secondary containment) into their Pollution Control Ordinance. The City of Sterling Heights has amended similar standards into the Fire Code and plans parallel zoning ordinance amendments in the future.

These communities have found it useful to have specific standards in their zoning ordinances and have not experienced difficulties with administration. On complex site plans where substantial quantities of hazardous substances are stored, the site plan review process emphasizes coordination with county and state agency requirements. For small projects, local officials handle the review themselves or obtain technical information and advice from county health departments.

The standards and procedures recommended in this guidebook were developed by the Clinton River Watershed Council, working in cooperation with local, county and state representatives. For further information, the May 1990 publication 'Site Plan Review and Groundwater Protection - A Guidebook for Local Government Officials'" will be of use.

Sample Site Plan Review Standards for Groundwater Protection

The following sample ordinance language would be added by amendment to a local zoning ordinance.

Hazardous substances definition: A chemical or other material which is or may become injurious to the public health, safety, or welfare or to the environment.

Applicability of site plan review standards for groundwater protection: Facilities which use, store or generate hazardous substances in quantities greater than 100 kilograms per month (equal to about 25 gallons or 220 pounds) shall be subject to site plan review requirements.

Site Plan Review Information: (added to a listing of other information requirements):

- Location and size of interior and exterior areas and structures to be used for storage, use, loading/unloading, recycling, or disposal of hazardous substances.
- Location of all underground and above ground storage tanks for such uses as fuel storage, waste oil holding tanks, chemical storage, hazardous waste storage, collection of contaminated stormwater or wash water, and all similar uses.
- Location of exterior drains, dry wells, catch basins, retention/detention areas, sumps and other facilities designed to collect, store or transport stormwater or wastewater. The point of discharge for all drains and pipes shall be specified on the site plan.
- Delineation of areas on the site which are known or suspected to be contaminated, together with a report on the status of site cleanup.
- Submission of the *"Hazardous Substances Reporting Form for Site Plan Review."'*

- Submission of the *"State/County Environmental Permits Checklist."*

Site Plan Review Standards:

1. Sites at which hazardous substances are stored, used or generated shall be designed to prevent spills and discharges to the air, surface of the ground, groundwater, lakes, streams, rivers or wetlands.
2. Secondary containment for above ground areas where hazardous substances are stored or used shall be provided. Secondary containment shall be sufficient to store the substance for the maximum anticipated period of time necessary for the recovery of any released substance.
3. General purpose floor drains shall only be allowed if they are approved by the responsible agency for connection to a public sewer system, an on-site closed holding tank (not a septic system), or regulated through a State of Michigan groundwater discharge permit.
4. State and federal agency requirements for storage, spill prevention, record keeping, emergency response, transport and disposal of hazardous substances shall be met. No discharges to groundwater, including direct and indirect discharges, shall be allowed without required permits and approvals.

The following is a specific site plan review ordinance for Oxford Township in Michigan.

OXFORD TOWNSHIP, OAKLAND COUNTY, MICHIGAN

Zoning Ordinance Provisions for Site Plan Review and Groundwater Protection

SECTION 2221. Site Plan Review and Approval

A site plan shall be submitted for all new construction, structural alteration, or substantial change in use, as determined by the Planning Commission, for all principal permitted uses in R, RM, MHP, 0, C-1, C-2, C-3, M-1, M-2, and RO districts, for all Special Land Uses in every district, and for any other use which requires an off-street parking lot. Prior to the issuance of a building permit or a certificate of occupancy, all required information shall be shown on a site plan drawing filed with the application form provided by the Township Clerk. When the required number of copies of the application and the site plan drawing are received, the matter will be scheduled for review by the Planning Commission's Site Plan Committee and the site plan will be forwarded to the Township Planner, Township Engineer, and Township Attorney (where necessary) for their professional review and comment. After review by the Site Plan Committee, the site plan application and materials along with the Township's professional and departmental reviews will be forwarded to the full Planning Commission for their next regular meeting with a recommendation for approval, conditional approval, or denial.

Application Form Contents

1) Applicant's name and address.
2) Name of the proposed development.
3) Common description of the property and complete legal description.
4) Dimensions of land, width, length, acreage and frontage.
5) Existing zoning and zoning of adjacent properties.
6) Proposed use of land.
7) Name, address, city and phone number of:
   a) Firm or individual who prepared site plan.
   b) Legal owner of property.
   c) Applicant (including basis of representation).
8) Signature of legal owner if not the applicant.
9) Completion of the form titled "Groundwater Protection Information for Site Plan Review" provided by the Township.

Site Plan Drawings - Required Contents

1) Location map showing site in relation to nearest major intersection.
2) A scale of not less than 1" = 30' if the developed portion of the subject property is five (5) acres or less, and 1" - 100' if over five (5) acres.
3) Date and north point.
4) Location of all existing and proposed structures and uses.
5) All aisles, drives and parking areas (include the number of spaces in each).
6) Screening and/or protective walls. (Section 2218)
7) Principal and accessory buildings.
8) Location of existing and proposed rights-of-way, widths of all abutting streets, alleys and easements.
9) Types of facing materials to be used on structures.
10) Elevations (front, sides and rear views) of all sides of the building(s).
11) A floor plan drawing showing the specific use areas of all existing and proposed buildings on-site.
12) Seal of registered Architect, Landscape Architect, Land Surveyor, Professional Community Planner or Civil Engineer who prepared the plan. In cases of minor structural alterations where professional services are not required, additions of three hundred (300) square feet or less, or for changes in the use of existing buildings, the Planning Commission may waive this requirement.
13) Density calculations (for multiple family projects).
14) Existing buildings or improvements on the site and on all property adjacent to the site that are within 100 feet.
15) Designation of units by type of buildings.
16) Interior sidewalks and sidewalks within right-of-way.
17) Exterior lighting locations types of fixtures, and methods of shielding them from projecting onto adjoining property.
18) Trash receptacle location and method of screening.
19) Landscape plan. (Section 2208)
20) Drive or street approaches including acceleration, deceleration and passing lanes, if appropriate.
21) All utilities located on or serving the site.
22) Loading and unloading area.
23) Total floor area.
24) Designation of fire lanes.
25) Where large equipment or machinery is to be installed as part of the development, the

location, type, horsepower, fuel, dimension, noise, vibration and emission levels, and other data of all such equipment or machinery.

26) Location and extent of development of recreation areas, where necessary.
27) Existing and proposed contours shall be provided at an interval of one (1) foot. These shall clearly indicate the proposed Grading and Drainage Plan and shall identify any areas of reclaimed or filled land. All uses shall detain storm water so that the run-off from the property occurs at not more than an agricultural run-off rate.
28) Address location on building (minimum 6 inch numbers).
29) Show all interior and exterior areas to be used for storage, use, loading/unloading, recycling, or disposal of hazardous substances and polluting materials.
30) Identify the location of all underground and aboveground storage tanks for such uses as fuel storage, waste oil holding tanks, collection of contaminated storm water, and all similar uses.
31) Identify the location of exterior drains, dry wells, catch basins, retention/detention areas, sumps and other facilities designed to collect, store, or transport storm water or wastewater. The point of discharge for all drains and pipes shall be specified on the plans.
32) Provide soil data, such as soil borings by an independent testing lab, at least equal to the detail provided by the U.S. Soil Conservation Service.

Sign Information

Separate drawings of the proposed sign(s) to be erected on the site may be submitted at the time of site plan review or at a later date. The location of all signs shall be shown on the site plan but the following detailed information may be deferred until later, if the applicant chooses:

1) Height of the sign above the ground.
2) Surface of the sign (materials and dimensions).
3) Area of sign surface.
4) Lettering of sign, drawn as it will appear on the erected sign, need not be in the style of the finished sign but must be neatly printed in the size and of a weight approximating that of the final constructed sign.
5) Method of illumination, if any.

Procedures

The petition will be placed on the agenda of a meeting of the Planning Commission and a decision for acceptance, revision or disapproval will be made after the commission has received a report and recommendation from the Site Plan Committee, all Township departments, Township Planner, Township Engineer and/or Township Attorney where necessary.

1) Upon determination of the Planning Commission that a site plan is in compliance with the Zoning Ordinance as amended, and other plans or regulations, it will be so indicated on the site plan.
2) Upon determination of the Planning Commission that a site plan is in compliance except with minor revisions, said changes shall be so indicated. When these changes have been adequately provided, the petitioner may resubmit the site plan to the Planning Commission for approval.

APPENDIX G

SUGGESTIONS FOR PUBLIC OUTREACH / EDUCATION

Many communities, states, and organizations have developed tools that can help in delivering a message about wellhead protection to local citizens. The following gives examples and/or samples of the kinds of outreach materials that have been developed.

General Ideas

Newspaper articles, TV, radio spots, and press releases all can be developed for distribution. Getting the word out about the need for groundwater protection and the wellhead protection program in as many formats as possible will be a big boost for the program. Many of the references listed below have examples of these types of materials.

Arranging programs on wellhead protection/groundwater protection topics with invited speakers is a good way to educate the public. Programs can be aimed at both adults and children. Material can be developed specifically for use in the schools. Some of the references listed below have developed materials for use in schools. The Iowa Rural Water Association can often assist with this. Other organizations listed in Table 4 may also be able to provide assistance in putting together a local program.

Materials to hand out at fairs and public meetings can often be useful. These might include bumper stickers, refrigerator magnets, window stickers, and posters. T-shirts for volunteer members of the wellhead protection committee are often a good idea, particularly for those doing the contaminant inventory process. Examples of wording could include:

- I DRINK GROUNDWATER
- DRINKING WATER: KEEP IT CLEAN
- WELLHEAD PROTECTION: IF YOU'RE NOT PART OF THE SOLUTION, YOU'RE PART OF THE POLLUTION
- PROTECT OUR GROUNDWATER

Brochures

These can be developed to send out with local water bills or to have in area businesses. A variety of brochures have been developed. Many give an overview of what wellhead protection means. In some cases where the delineation is already complete, they will include a map of the delineated

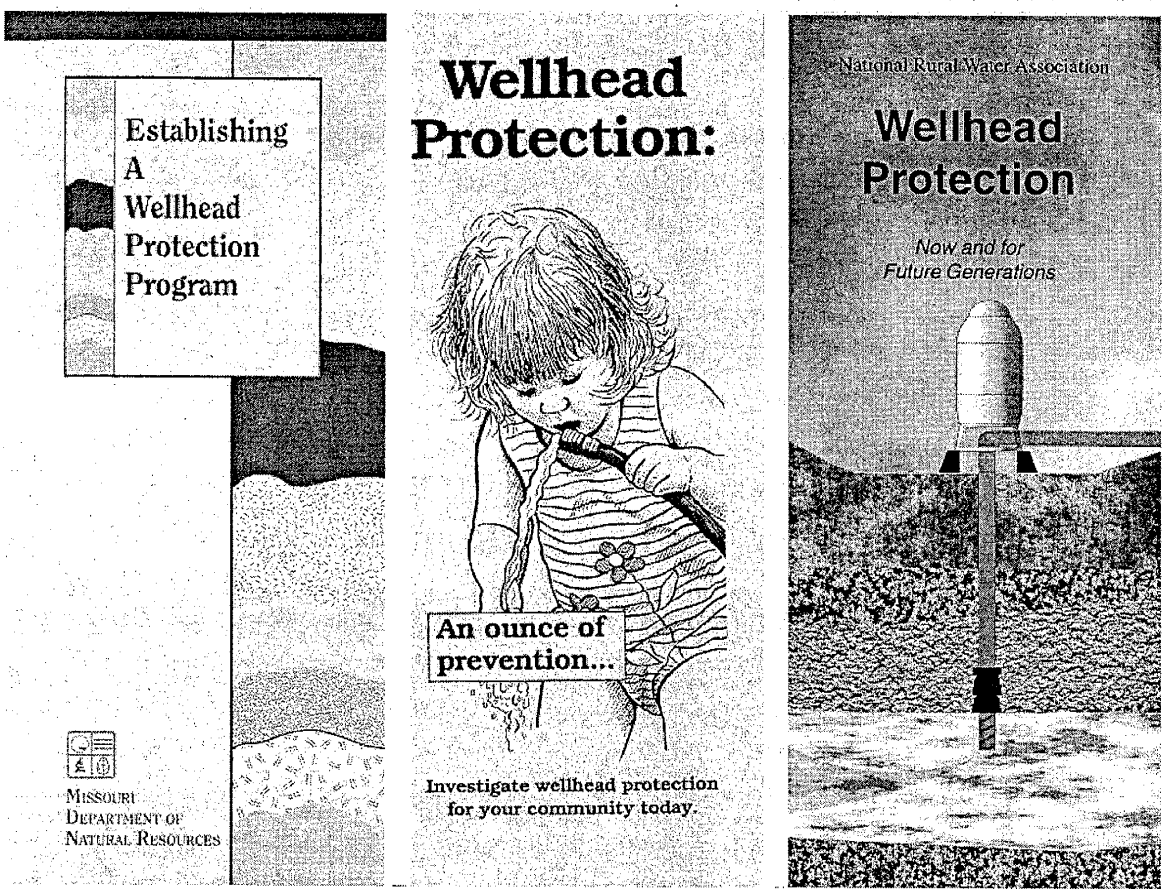
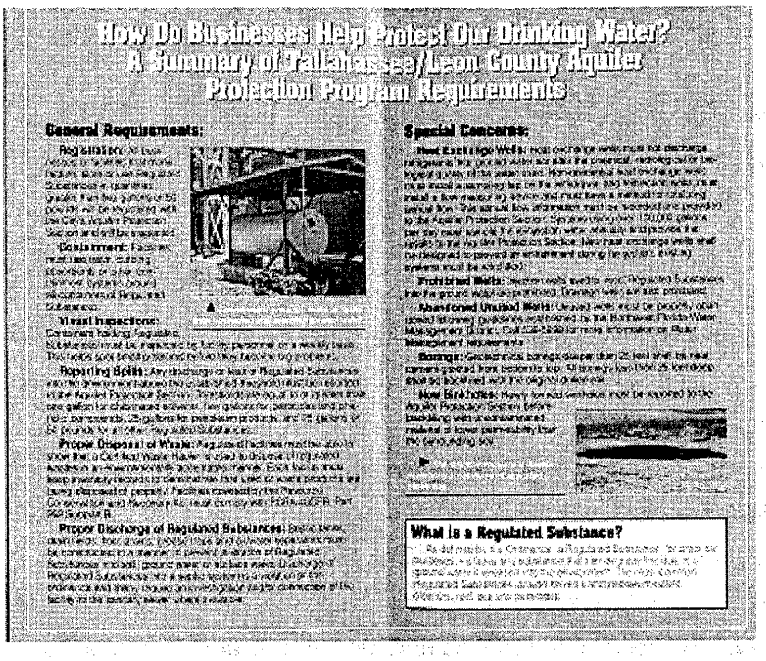


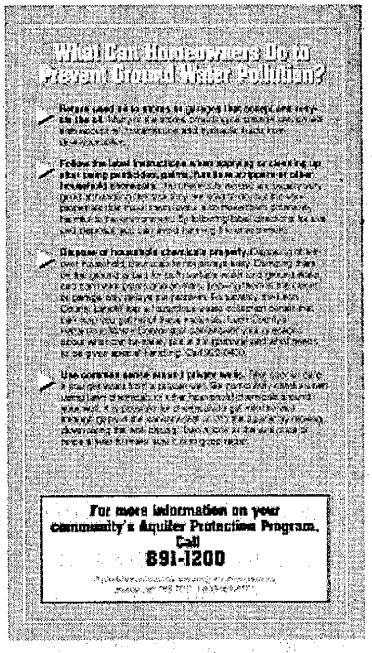
Figure 9. *Samples of wellhead protection brochures.*

area. Brochures can be developed about individual wellhead protection concepts as well. For instance individual brochures could be developed to give Best Management Practice suggestions to local businesses – automotive-related, dry cleaning, and agricultural. Others might target homeowners and safe disposal of home products.

Slide training shows

EPA has developed a series of materials for Wellhead Protection Implementation Training. This contains a variety of EPA documents on wellhead protection as well as an extensive set of slides for developing a presentation. This can be borrowed from EPA, Region 7, 726 Minnesota Ave., Kansas City, Kansas 66101, 800-223-0425, 913-551-7003. Indiana has a number of scanned slides about wellhead protection: www.agry.purdue.edu/agronomy/water/whpaclip/slides.html.





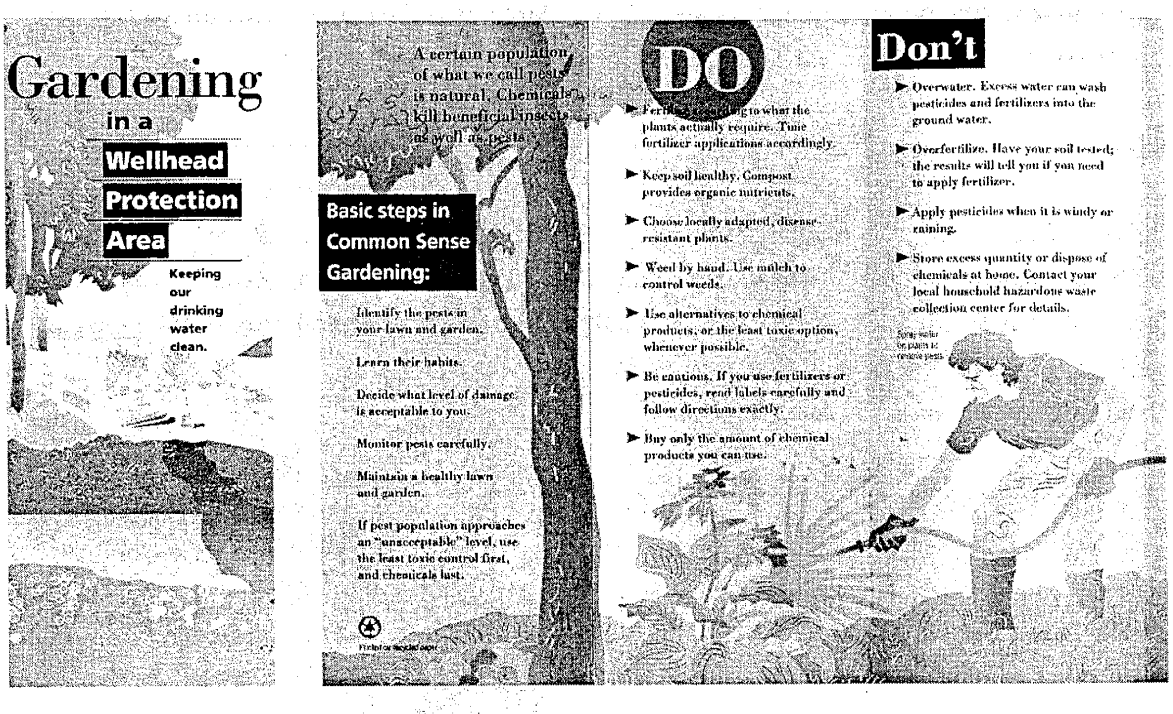


Figure 9. Continued.

Videos

Wellhead Protection: A Model Plan for Iowa is a video designed for Iowa about wellhead protection. It is available from Des Moines Water Works or IDNR-EPD. This video was distributed to most community drinking water systems in 1997.

An Ohio EPA video entitled "Ground Water and the Ohio Wellhead Protection Program" explores the question of where does our drinking water come from and explains the Ohio Wellhead Protection Program. The video is designed for viewing by a general audience, from schoolchildren to community officials who may be initiating local Wellhead Protection plans. The video follows two children and their mother as they visit a local water treatment plant and two State agencies to learn about the source of their drinking water. They learn how ground water flows through the subsurface to the wells that pump it into a water treatment plant. They also learn how ground water can be contaminated by pollution sources such as leaking underground storage tanks, major transport spills, and septic systems. Finally, they are introduced to Ohio's Wellhead Protection Program—a pollution-prevention program designed to minimize the risk posed by these kinds of sources to ground water used for public drinking water.

Signs

The Iowa Rural Water Association has developed a road sign for use in communities with a wellhead protection program. These are official metal road signs measuring about 24 x 24 inches. The wording is WATER SUPPLY PROTECTION AREA and is in white letters on blue reflective background. Signs have been developed in other states. Examples of wording include:

- ENTERING (name of town's) WELL HEAD PROTECTION AREA
- ENTERING (name of town's) WATER SUPPLY PROTECTION AREA

Figure 10. *Example of wellhead protection road sign.*

Internet Sources of Information

There are a variety of sources on groundwater and wellhead protection. Many of these are listed in the reference section. However, with the widespread use of electronic communication, a great deal of information can now be found on the Internet. The following sources of information might in helpful in developing a wellhead protection program. If your organization does not have immediate access, the local ISU Extension office can assist you.

EPA

Since the EPA is the primary federal agency involved in wellhead protection, much information is contained on their home page. The general address is www.epa.gov. A link directly to the office of groundwater and drinking water is www.epa.gov/OGWDW. This site contains an overview of EPA publications along with information on how to order them, some information on drinking water aimed at children and teachers, EPA databases which may allow you to gather some information about your local water supply, and some links to other water resources related areas. In addition, there are always updates on new rules under the Safe Drinking Water Act that may affect a local community.

American Water Works Association

Their site has information useful to water operators as well as some useful educational materials under their Blue Thumb program. This contains press releases, camera-ready ads for newspapers, radio public service announcements, and other materials. WWW.AWWA.ORG/bluethumb

*Farm*A*Syst and Home*A*Syst*

These two programs have proven effective in wellhead protection where they are used to help the landowners improve practices on their property. Iowa does not yet have a program in place for distribution of these tools. A description of the program can be found on the USEPA web page on watershed tools (http://www.epa.gov/watershed/tools/). Further information on these programs can be gotten from the Farm*A*Syst home page at www.wisc/edu/farmasyst.

League of Women Voters

In many states the League has been very active in wellhead and source water protection. A

complete reprint of their document, "Protecting Your Groundwater: Educating for Action" is available at www.cpn.org/sections/tools/manuals/groundwater1.html

States

Other state wellhead information areas: Many of these have downloadable brochures, documents, training tools, and other materials that could be modified for local use.

Massachusetts

www.magnet.state.ma.us/dep/brp/dws/files/tips.htm

www.magnet.state.ma.us/dep/brp/dws/files/donts.pdf (This document requires an Adobe PDF reader)

Texas

www.tnrcc.state.tx.us/water/wu/mon/whp/index.html

Ohio

www.epa.ohio.gov/ddagw/pdu/wellhead.html

Indiana

www.agry.purdue.edu/agronomy/water/idem/whpintro.html

www.agry.purdue.edu/agronomy/water/whpa/whparesc.htm

APPENDIX H

IOWA DRINKING WATER SUPPLY CONTINGENCY EMERGENCY PLAN

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CHAPTER I
GENERAL

A. Responsibility of Local Water Utility

Community drinking water utilities operating within the State of Iowa have the responsibility of providing a continuous supply of water (of authorized quality) to all domestic, commercial and industrial customers within their service area. Most drinking water utilities have the added duty of furnishing water in sufficient quantities and at proper pressures to assist in fire protection. Citizens have come to expect a fail-safe water supply.

B. Operational Problems

Each system is faced with potential disruptions in service due to recurring, normal operational problems. Such problems include water main breaks, leaks, valve failures, equipment breakdowns, temporary losses of electric power, and an altered status in either quantity or quality of water supply. Large systems serving major metropolitan service areas view such occurrences as everyday operation and maintenance problems; small water utility systems often classify these disruptions in service as a very real crisis.

C. Natural and Man-Made Disasters

These crisis situations may create emergencies for all utility systems, large or small. Such circumstances must be promptly dealt with to provide continuity of service and to safeguard public health. These events typically include natural occurrences; winds or tornadoes, earthquakes, extended periods of weather extremes, freezing or drought. Manmade causes affecting the ability of the system to provide a proper level of customer service include inadvertent or deliberate contamination of water supplies, vandalism or civil disorder resulting in damage to system components and labor walkouts and strikes involving waterworks or allied utility or industrial personnel.

D. Reaction to Emergency Conditions

Emergency situations demand prompt and appropriate reaction on the part of each water utility in order to protect human health and safety. The accountability for immediate response to an emergency rests with the individual utility involved; however, the State of Iowa, having the responsibility for general supervision of drinking water systems operations, must likewise be prepared to

respond and assist in potentially dangerous situations.

E. Planning for Emergencies

Pre-emergency planning might well shorten the term of a given emergency situation, maximize service to all users, and provide the highest degree of protection of safety and health to the residents and business establishments of Iowa. This plan will establish an emergency organizational structure and procedures to be used by the Iowa DNR in combating typical water supply crises. This plan also recommends items that should be considered by each water utility in the development of their own local plan.

CHAPTER II
AUTHORITY

A. United States Law

Public Law 93-523, "Safe Drinking Water Act," Section 1413 (a) (5) permits a state to assume the primary enforcement responsibility for public water systems within that state. The U.S. Environmental Protection Agency grants this responsibility, and it is contingent upon the requirements established by EPA in Part 142, "National Interim Primary Drinking Water Regulations Implementation," Subpart B of the Act, "Primary Enforcement Responsibility."

B. Criteria for Primary Enforcement

Subpart B establishes the criteria for granting of primary enforcement responsibility to the state in five parts, (a) through (e). Part (e) requires that, as a condition of enforcement responsibility, a state "has adopted and can implement an adequate plan for the provision of safe drinking water under emergency circumstances."

C. Designation of Iowa DNR

Iowa has assumed Primary Enforcement Responsibility for public drinking water systems located within the State. Authority has been given to the Director, Iowa DNR, by Iowa legislative action. Working authority has been assigned to the Environmental Protection Division by the Iowa DNR Director.

CHAPTER III
MINIMUM FEDERAL REQUIREMENTS FOR EMERGENCY PLANS

A. Guidelines

U.S. EPA has published "Guidelines for Review of the Adequacy of the State Emergency Plans." This document presents limited guidelines as to the minimum contents of a state plan containing the following elements:

Communication - A plan should promote human awareness and readiness to respond to disasters. The plan should designate key personnel who would be available under emergency conditions.

Inventory - The state should maintain current inventories of public water systems and available emergency equipment. The equipment inventory should include location, technical description and procurement procedure for all items of available equipment. The state should have regulatory authority to obtain emergency equipment promptly when it is required.

Local Plans - The plan should stimulate each public water system to prepare and officially adopt a local plan containing information relative to communication and liaison with state agencies, alternate sources for supply, inventories of equipment and materials together with emergency procurement procedures for these items, detailed information relative to outside services which might be required during emergency periods, personnel assignments during emergencies, etc.

Coordination - A number of Federal and State Agencies are involved in emergency planning. Many provide assistance which is unique to their agency mission. The various kinds of assistance may be useful in the State's "Drinking Water Supply Emergency Plan." The plan should provide for coordination and identification of all available assistance.

Public Information - A State plan should include a public information program which would let the public know expectations relative to citizen cooperation necessary in the event of an emergency.

CHAPTER IV
NATURAL DISASTERS

A. General

Historically drinking water systems in Iowa have suffered natural damage. These events include rapid release of enormous quantities of energy such as floods, tornadoes, damaging winds and lightning, and conceivably earthquake effects, and those which occur over long periods of time like droughts and temperature extremes. All such natural events may create an adverse effect upon a water supply depending upon their severity.

B. Flooding

Flooding associated with major rivers normally occurs during the winter months or in early spring. Flash flooding associated with small streams may occur at any time as the result of a locally heavy rainfall or rapid snowmelt. Flooding is the easiest type of natural disaster to predict and provide maximum advance warning for. Surface water treatment facilities are obviously more vulnerable to flood damage. Major drinking water system problems created by flooding are:

1. Structural damage to intake or well and treatment facilities and within the distribution system due to the rapid flow velocity associated with flood flows.
2. Loss of Electrical Power due to flooding of power station or washout of electrical distribution network.
3. Contamination of supply (wells) and treatment plant units (clearwells) by elevated water levels.
4. Water damage to electrical and control components of water system.
5. Additional loading on treatment works due to high turbidity of surface water supply.
6. Access to various portions of system limited by the presence of flood waters.
7. Washout of rural water system distribution lines.

C. Tornadoes, High Winds and Lightning

Weather conditions suitable for the propagation of tornadoes or high winds and lightning generally associated with thunderstorms are predictable. The actual occurrence often strikes quickly and without significant warning. The maximum period of hazard due to such events in Iowa occurs during the period of April through July. Iowa is geographically in a high risk location relative to tornadoes. Damage to water systems caused by such storms is potentially heavy. In addition, destruction or damage of facilities may severely limit the service capability of the system. Typical drinking water supply problems associated with high winds and tornadoes include:

1. Severe structural damage to all above ground components; buildings and treatment units, storage tanks, electric power and control circuits, maintenance vehicles, material stock piles and communications.
2. Severe system leakage due to ruptured service lines in damaged buildings and rural areas, fire hydrants broken by air-borne debris, associated distribution system contamination potential.
3. Death of experienced waterworks personnel and widespread debris hinders repairs.
4. Potential high fire-related demand for water.

D. Earthquakes

Earthquakes, while relatively rare in Iowa, have been experienced, notably from the New Madrid fault line. Geologists classify Iowa within a zone of potential minor to moderate damage resulting from earthquakes. Tremors possible in Iowa may effect an area as large as fifty square miles. Total energy release may be as great as that produced by the explosion of 200,000 tons of TNT, with resulting damage varying with the distance from the quake epicenter. Earthquakes occur with no prior warning and cause damage to both underground and aboveground facilities. Potential water system problems include all those created by tornadoes and also others unique to an underground disturbance:

1. Rupture of pipelines with loss of system pressure (and associated potential contamination).
2. Failure of or damage to structures impounding surface water supplies with potential loss of supply.
3. Deep wells fractured, creating possible contamination of underground water supply or total loss of wells.

E. Drought

Extended periods of drought create problems of a long term nature; however, the resulting water supply crises may prove to be extremely critical. Iowa has an extensive drought planning process via the 1985 State Water Plan and considerable experience in operating under drought conditions both locally and statewide. Specific operating difficulties connected with long term dry weather are:

1. A general increase in system demand as water used for irrigation becomes widespread and private groundwater supplies fail.
2. A decrease in elevation of groundwater table results in reduced well production or complete failure.
3. Severe reduction in streamflow volumes. Surface water supplies diminish, storage

reservoirs of raw water are not replenished, and pollution of surface water increases (as the ratio of contaminants to water volume rises).

4. Public water use-releated conflicts increase markedly.

F. Temperature Extremes

Temperature extremes of unusual duration may create water supply emergencies. Extended hot weather periods tend to multiply system demands for water. Extremes of hot or cold weather may increase demands on a local electric power system thereby reducing available voltage to treatment and pumping installations. Freezing weather produces cracked and broken water mains and service connections, and may cause failures of unprotected equipment or facilities. It also can freeze elevated water towers, resulting in leaks and ruptures.

CHAPTER V
MANMADE CRISES

A General

Humans may cause major damage to a water system or seriously impair its ability to provide service. An emergency may be the result of deliberate action such as acts of civil disorder, riot, or vandalism. Crises may also arise from human non-action as evidenced by labor strikes or slow-downs.

B. Riots

Riots generally include destruction of both private and public property. Water system facilities may be destroyed or their efficient operation interfered with. Personnel charged with water system operation may be injured or killed, thus reducing the ability of the system to perform in a normal manner. Subsidiary services such as electric power companies, allied utilities such as gas or fuel companies, communications operations, suppliers of expendable materials such as chemicals and others may be unable to perform their normal functions under riot conditions. The loss of these necessary services could cripple the operations of a typical water system.

C. Strikes

Strikes or slowdowns by operation personnel could lead to system shut-down even if enough supervisory personnel were available to provide some measure of service. Maintenance would necessarily suffer from lack of manpower. Major equipment failures or water main breaks would go unrepaired. Such occurrences could impair the operation of the systems, reduce the level of service, and could ultimately lead to complete shut-down.

D. Vandalism

Acts of vandalism have become a major problem in the United States. Contamination of water, significant losses of water, and willful destruction of water system property, equipment, and access have become real threats to continuity of service. Acts of vandalism may also cause disruption of outside services on which the water system depends. Normal maintenance operations may be delayed when water system personnel are required to take remedial action to counteract the acts of vandals.

E. Accidental Contamination

Accidental spills of toxic and some non-toxic materials into a raw water source pose unusual problems to a water utility. Industrial spills containing highly toxic chemicals which treatment processes, can rapidly infiltrate a water supply's distribution system rendering the water unfit for normal use. Expensive and sophisticated techniques must be employed in spill clean-ups. These are normally not within the technical capability of the utility as most utility personnel are not knowledgeable as to the requirements of chemical contamination treatment techniques. Valuable time may be required to mobilize appropriate technical personnel to the affected area to assist in the cleanup. The failure of a utility to act swiftly to obtain assistance could create a serious disaster, both in reality and in public relations.

CHAPTER VI
OPERATIONAL FAILURES

A. General

A water utility's supply to its customers depends upon the system's efficiency. However, if some failure occurs within the operational processes, the quality and quantity of service may reduce significantly; many times to zero. Failures which interrupt service constitute two categories; failures involving system components, and indirect failures involving outside mechanisms, such as power facilities and telephone equipment.

B. Mechanical or Equipment

System breakdowns, to a large degree, involve equipment failures within the treatment or pumping facilities. The breakdowns can include intake pumps, chlorination units, chemical feeders, testing equipment, and such structural components as clearwells, flocculation basins, and filter beds. Unattended mechanical devices will not maintain efficient functioning indefinitely. Neglect of periodic maintenance invariably leads to reduced equipment operating life and sudden unexpected failure. Occasionally, well maintained or new equipment malfunctions due to defects in the

manufacturer's workmanship or design. A utility that has no standby equipment may be crippled by equipment failures or be forced to operate at a level below normal efficiency.

C. Storage Facilities

A utility's distribution storage is also subject to failures. Metallic reservoirs may develop leaks, due to corrosion and due to cathodic protection equipment and protective painting systems not being properly maintained and periodically renewed. Standpipes with a poor history of maintenance commonly accumulate large volumes of sediment at the base of the tank. Sediment buildup can block the inflow/outflow piping thereby reducing, and in extreme cases, prevent the flow of water.

Under the winter climate prevalent in Iowa, standpipes and elevated storage tanks are subject to freezing. Severe freezing of the contained water could result in the rupture of the tank due to ice expansion. Vents that have become plugged with debris together with frozen overflow lines have caused tank ruptures. Foundations which crack, settle, or rotate could cause the rupture of a storage tank, resulting in a major loss of stored water or the facility itself.

D. Distribution Systems

Disruption of service to the general public may occur when distribution lines fail. Leaks or complete ruptures of metallic pipelines are commonly caused by highly corrosive water and soils. Improperly supported or restrained pipe sections may separate under pressure and cause leakage. Major leaks may occur when lines rupture due to overlying loads in excess of the design load. Pipes that do not have sufficient soil cover are subject to fracture due to ice expansion during extended periods of cold weather. Plastic pipes present an additional problem in freezing weather because induced thawing suitable for metallic pipes cannot be accomplished in situ without damage to the plastic pipe. Pipeline failures are fairly common occurrences.

Cross-connection contamination is also unfortunately somewhat prevalent in Iowa. A careful cross-connection control program can prevent influx of foreign materials such as fertilizer, pesticides, sewage, and non-potable washwaters.

E. Human Error

Another type of system failure involves human error. Any water system is subject to human error. Good training can reduce the likelihood of human error in the normal operation of a system, but there is no way to plan for or completely foolproof a system against it. A sound emergency plan covering numerous anticipated emergency conditions is the most effective way to prepare for this type of failure.

F. Indirect Failures

Indirect failures affecting the system, although not as common in occurrence as those previously mentioned, may be as crippling to a water utility system. For instance, the chief source of power for most operations is electricity furnished by an outside agency. If for some reason electricity is unavailable to the water utility and no standby generating facilities exist, the result is almost complete operational shutdown (depending upon the volume of water contained in overhead storage). Most power outages are of short duration; storage will normally handle system demand until power can be restored. However, extensive power outages can be catastrophic without standby power.

Failures may result from malfunctioning telemetry equipment while others may be magnified in intensity by the absence of a proper communications system. Faulty telemetering equipment can provide erroneous information as to system reserves, thereby presenting the operator(s) a false sense of security or reason to initiate unnecessary emergency procedures. The absence of a phone or other rapid means of communication at a remotely located water plant could permit an accidental contamination to become a major problem before the situation is reported.

Deficiencies in material supplies create the possibility of system failures. If important chemicals such as chlorine, alum, lime, soda ash, et. al. become unavailable for a plant's treatment processes, then potable water is virtually impossible to produce. As a result, most water systems would be forced to cease operation and the few plants that could shift to other treatment processes would be faced with a severe increase in operating costs. Material supplies may be curtailed by transportation failures or strikes, each beyond the power of the utility to control.

CHAPTER VII
ROLE OF THE IOWA DNR

A. General

By accepting primary enforcement responsibility under the "Safe Drinking Water Act" (PL 93-523), the Iowa DNR has been charged with developing an emergency drinking water supply plan which will be made available to all waterworks systems within the state. Due to limitations in number of staff, the Iowa DNR cannot provide for direct state assistance to a local system in an emergency situation. Therefore, a plan had to be developed where the Iowa DNR could offer advisory services and coordination efforts to local water systems.

B. Advisory Assistance

IDNR has the capabilities of providing advisory assistance to any water system faced with an emergency. Their Water Supply Section staff has the experience and background to offer advice during emergencies as to proper remedial measures. Therefore, the primary goal of the Iowa DNR will be to provide technical advice and to help in coordinating relief efforts of outside agencies.

C. Directory, Iowa DNR

The Central Office of the Iowa DNR, located in Des Moines, is the headquarters for the six Regional Offices located in (1) Manchester, (2) Mason City, (3) Spencer, (4) Atlantic, (5) Des Moines, and (6) Washington. With respect to those emergencies requiring outside help, these Iowa DNR offices will be able to provide help in receiving outside sources of assistance. It is important for local water utilities to know or have ready access to phone numbers of the Central Office and their respective Regional Office. The following Tables tabulate these offices, titles of persons to contact and their telephone numbers. These data are current as of the date of publication of this document; however, it is the responsibility of each local system to keep them up to date. Also, the Iowa DNR's Emergency Response Section can be reached as a **first point of contact** at 515-281-8694. This Section can then provide guidance as to the next steps to pursue in whichever emergancy situation has arisen. This section works out of the IDNR Central Office.

The first avenue of approach to the Iowa DNR should be the applicable Regional Office or the Emergency Response number. These Iowa DNR personnel will assume the responsibility of notifying other impacted Central Office staff in Des Moines. Stress should be placed on the necessity of notifying the Regional Office irrespective of the relative severity of the emergency situation. Notification by the local utility should be made during normal business hours at the first opportunity following the onset of the emergency.

IOWA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION REGIONAL OFFICES

Address	*Telephone*	*Supervisor*
1. 909 West Main St Manchester, Iowa 52057	*319-927-2640*	*Jerry Rattenborg*
2. 2300 15th St SW Box 1443 Mason City, IA 50401	*515-424-4073*	*Bill Jinkinson*
3. 1900 North Grand Ave Spencer, IA 51301	*712-262-4177*	*Barb Lynch*
4. 706 Sunnyside Lane Atlantic, IA 50022	*712-243-1934*	*Dan Stipe*
5. 401 SW 7th St. Ste I Des Moines, IA 50309	*515-725-0268*	*James Stricker*
6. 1004 West Madison Washington, IA 52353	*319-653-2135*	*Al Goldberg*

D. Laboratory Backup

In preparation for the possibility of emergencies requiring chemical and microbiological testing, the University of Iowa Hygienic Laboratory has developed a means of providing laboratory assistance to all public water systems within the state. This service will enable systems to test for water purity beyond their individual capability and identify the nature of their problems in minimal time. The UHL can be contacted in Iowa City at 319-335-4500 or in Des Moines at 515-281-5371.

E. Emergency Response

As part of its assistance under the emergency plan, the Iowa DNR has established an Emergency Response Section for the purpose of providing emergency means for containment and clean-up of chemical spills. This section works out of the IDNR Central Office. The Emergency Response Section can be reached at 515-281-8694 or indirectly through the 911 system in most counties. The Emergency Response number can also be used in cases where chemical contamination of the distribution system has been identified due to cross-connection intrusion, even if no spill has occurred. However, the applicable field office should be the first point of contact.

F. Review of Local Emergency Plans

Water utilities in the interest of emergency preparedness and plant personnel safety should have their own emergency plans or should be taking steps for compiling such plans. The Iowa DNR, as part of this program and as staff time allows, may assist local utilities by reviewing local emergency plans in order to judge the general adequacy of those plans. Current local emergency plans are to be available for evaluation at the time of the water supply sanitary survey by Iowa DNR Regional Office personnel. Such a review keeps local emergency plans up to date and reinforces the plan contents and procedures in the minds of those who will implement them.

G. Summary

The Iowa DNR will serve as an advisor to the Governor in the event of a major water utility emergency or disaster situation. Request for any aid from the State such as the use of the Iowa Emergency Management Agency of the National Guard must be reviewed and evaluated by Iowa DNR before the Governor will consider granting the aid requested.

Although the Iowa DNR can be authorized to provide assistance and coordination for relief in emergency conditions, the local utility experiencing the emergency must make immediate notification to the Iowa DNR in order to initiate appropriate action. Without this cooperation between the utility and the Iowa DNR, valuable time could be lost thereby increasing the severity of the situation. The sole responsibility for reaction to an emergency situation rests with the local utility and the governing body of the political subdivision of the service area.

CHAPTER VIII
WATER SYSTEM VULNERABILITY ANALYSIS

A. Purpose

A water supply utility is urged to prepare a system vulnerability analysis. An analysis will show how well the particular utility provides service to its customers under normal and abnormal conditions. Since each system has its own distinctive components, a vulnerability analysis must be individually tailored for each system. It is of prime concern during any water system emergency to maintain a pressurized water distribution system. A continuously pressured system resists backflow contamination into the system and reduces the amount of cleaning and disinfection required for transmission and for service lines during the recovery period.

B. Identification of Weak Spots in System

A vulnerability analysis must be done in detail. First consideration should be given to the identification of existing weak spots within the water system. These may include corroded valves, severely corroded chlorination equipment, defective electrical wiring, severely pitted pump impellers (from cavitation), etc. Such items as valve location and spacing, spare pumps, sufficient storage volumes of water, stockpiles of expandable materials and spare parts, operator training, system records, etc. must also be included. Such items may be minor in nature during normal operational conditions, but could increase the severity of the problem during emergencies. Once problems are identified, steps should be taken to correct these deficiencies. As time and funds permit, corrective measures to reduce discovered deficiencies should be planned and scheduled,with definite time-tables for their implementation set.

Secondly, the analysis serves to identify weak spots within a system or corollary systems which, for on reason or another, cannot be easily rectified within a short time. By this type of disclosure, advance planning necessary to establish remedial measures may be done and a better understanding of the shortfall of the system recognized.

C. Estimates of Service Capability under Emergency Conditions

The third step required to complete a vulnerability analysis is to anticipate as many potential system breakdown points as possible. Such breakdowns should be categorized as the results of natural, manmade, or operational failures. This could include piping ruptures caused by the settlement of earth (natural), a vandalized plant control room (man-made), and a flocculation basin inactivated by the breakdown of an intake pump (operational), for example. After identifying all such possible failures, it is then necessary to estimate the quality and/or quantity of water available under conditions imposed by each identifiable failure. Such estimate would permit the water utility to predetermine the quality and/or quantity of customer service which would be available during emergency situations. Estimates should be made for the existing system containing known weak spots, and for the system subsequent to remedial measures which would harden the system and improve its reliability.

D. Down Time

The last step required to complete the analysis is the estimation of time during which the system would operate on a reduced basis under each emergency situation. This estimate would include necessary time for procurement of materials, repair parts, outside repair services, physical repair of damaged system components, necessary sterilization of contaminated components, availability of trained personnel to effect repairs, etc. This portion of the analysis will permit the utility to estimate down times beforehand and to plan for alternate supplies of potable water in those cases involving significant loss of production capability over an extended time.

E. Components to be Analyzed

Seven water system components should be analyzed for failures that might incapacitate the system. These include the source of water, the treatment facilities, the transmission and distribution lines, storage facilities, water system personnel, records (plans, operating manuals, etc.), and indirect components. Comprising the indirect components are electric power, supplies and materials, communications including telemetry, and facility and personnel security. The last two indirect components may also be classified as direct components depending upon the individual facility.

F. Summary

The vulnerability analysis must be accomplished for each individual water system under conditions imposed by each assumed emergency or disaster situation. The primary results of the analysis will be:

1. Identification of system soft spots.
2. Prioritized schedule for elimination of major points of system vulnerability.
3. Estimates of reduced system capability (quality and quantity) and time required to return system to normal operation after the occurrence of a disaster or emergency creating condition.

The analysis would best be accomplished in five definite steps for the specific water system involved:

1. Identify and characterize each individual major component part of the water system as applicable.
    a. Water Source
    b. Treatment Facilities
    c. Transmission and Distribution System
    d. Storage Facilities
    e. Water System Personnel
    f. System Records, Plans, Operating Manuals, etc.
    g. Indirect Components
        Electric Power
        Supplies and Materials
        Communications and Telemetry
        Facility and Personnel Security
2. Assume a potential disaster or emergency condition including probable severity such as depth of floods, typical wind velocities, length of drought, etc.
3. Estimate effects of the "Design Emergency" upon each of the system components, direct or indirect.
4. Estimate system output available as a result of possible reductions in capability determined under 3.
5. Estimate restoration time.

CHAPTER IX
COMMUNITY REQUIREMENTS FOR WATER UNDER EMERGENCY CONDITIONS

A. General

Regardless of the severity of an emergency situation, communities will require at least a minimum quantity of potable water to sustain life and provide for sanitation. Such requirements differ widely from those under normal circumstances. Therefore, a determination of these needs must be made. Before individual needs can be discussed, water requirements under emergency conditions must be identified. Conditions may be broken into four stages of recovery, each of which require a differing level of water service. Each subsequent stage and level becomes an improvement over the previous one, from bare survival to normal conditions.

B. Four Levels of Service

The first level, survival condition, is rather straightforward. Potable water in extremely minimum quantities is necessary for the essentials of existence; human consumption, and cooking purposes. Hospitals, care centers, relief stations, and mass shelters will also require water for the same two purposes. They'll also need additional amounts for sanitation purposes in connection with surgical procedures and bed care of patients. Estimates of human water demands under bare subsistence conditions are readily available. Estimates are provided in section D (Unit water requirements).

Within two days, in order to safeguard public health, the second level of service must be provided. Primary needs at this level, in addition to level one, require potable water for general sanitation purposes of all persons within the service area. Such requirements include sufficient water to service toilets and to permit washing and bathing by individuals.

The third level begins only at such time as second level requirements have been increased to near normal levels for drinking, cooking, and sanitation and when additional volumes of water become available. Fire protection can now be added at this point so that property destruction can be minimized and citizens can be safeguarded. To provide for this added demand, potable water reserves will have to be built up substantially or an alternate source of non-potable water obtained. Depending on the nature of the emergency, fire protection services may be required within the community before level three service is available. These services would necessarily need to be provided form outside the community by disater relief authorities.

The fourth level of service is possible as system capabilities increase due to the continued applica-

tion of remedial measures and near normal service is possible. This would allow for at least partial service to be provided for industrial, commercial, and agricultural demands. This should be done for selected users only. Selection is based on community requirements for production of daily essentials. As time passes, less essential users could be added back on until service reaches previous capabilities.

C. Comparison of Available Water with Service Levels

A determination of the community requirements for water at each of the four levels allows comparison with the quantity data compiled for the various water system components. These comparisons will be very important in estimating the water available under each emergency type with respect to requirements demanded by each service level. Also, the comparison will enable the utility to determine the type and duration of service(s) which it needs to provide, the shortfall quantity, and the amount of potable water which have to be obtained from alternate sources.

D. Unit Water Requirements of the Community

The U.S. Department of Defense has published a technical guide containing realistic data on individual water requirements after a nuclear attack. These figures may be used to determine the needs at each of the previously mentioned four levels of service.

Level 1 - Potable water for human consumption, drinking and cooking and sanitation of hospital equipment are the only permitted uses. Requirements have been established as follows:

a. Individuals: 0.5-5.0 gallons per capita per day (GPCD)
b. Hospitals and care centers: 5 -15 GPCD
c. Mass shelters: 3 GPCD

Level 2 - Potable water for human consumption and general sanitation. Requirements are as follows:

a. Individuals: 25 GPCD
b. Hospitals and care centers: 25-40 GPCD
c. Mass shelters: 25 GPCD

Level 3 - Increased usage for human consumption and general sanitation plus reserves for fire defense. Requirements are as follows:

a. Individuals: 40 GPCD
b. Hospitals and care centers: 40 GPCD
c. Mass shelters: 25 GPCD

d. Fire defense reserves: Based upon past experience of the community's fire fighting demands and system ability to produce or obtain additional water.

Level 4 - Conditions near normal before selective industrial, commercial, and agricultural usage is permitted. Such usage is relative to the system's production capability.

CHAPTER X
DEVELOPMENT OF A LOCAL WATER SUPPLY CONTINGENCY PLAN

A. General

The ideas and procedures described in the previous sections of this document are ideal, and don't necessarily apply to every water system. In order to benefit a specific utility during an emergency period, all data pertinent to the individual water system must be organized and coordinated into a usable contingency plan.

B. Contents of a Plan

A well-written contingency plan must attempt to attain several important objectives. The contingency plan must concisely describe each possible emergency situation and the means and methods to use in reducing the cause of the emergency. The plan must also define the duties, responsibilities, and functions of all water system personnel with respect to each specific emergency condition. It should organize the use of all available resources in order to provide the highest level of service possible under a given set of circumstances. The plan should enable a utility to respond promptly and efficiently to crises without time wasted in unnecessary effort. The plan should catalog all resources available to the utility. Finally, the contingency plan should be tailored for each individual water utility. Briefly, a contingency plan states, relative to a given emergency situation, who does what and when.

C. Necessity for a Plan

The contingency plan is needed by a utility because of the reasons outlined below. Ultimately, such a plan is likely to save a utility money. The plan will provide assistance to the stricken area to maintain high levels of public health and safety. The plan facilitates the return of service to normal as rapidly as possible and provides the highest level of interim service possible. It may also reduce the amount of unnecessary spending resulting from false starts. Finally, the contingency plan will reduce the need for large numbers of decisions to be made during an emergency when human stresses are high. People can react irrationally during periods of great stress; erroneous

decisions may be avoided via prior planning.

D. Contingency Plan Revision

Once a contingency plan is prepared, it should not be viewed as a static document. Portions of the plan may quickly become outdated and thereby render cataloged relief measures useless when a crisis arises. Personnel, material and equipment suppliers, repair facilities, contractors, and government agencies are all prone to daily changes in contact persons, addresses and phone numbers. All these must be kept current to keep the plan effective. The plan must be corrected to complement system modifications which take place after the plan's initial preparation. Many systems are either renovated or totally rebuilt in order to meet altered system demands. Many change operational procedures as personnel are added to or subtracted from the workforce. Such changing situations dictate revisions in these plans. A contingency plan must be based on utilizing only those resources actually available. Such resources must be carefully checked as to their availability before they are included in the plan. The availability of such resources varies from time to time. The plan must stay current with such changes. IDNR advises taking a look at the utility contingency plan at least once every three years.

E. Steps in Preparing a Contingency Plan

1. The shaping of the contingency plan is the single most important item in preparing for an eventual emergency. Accordingly, the plan must be carefully done. Responsibility for the formulation of the plan in most cases will rest upon a key water systems supervisory staff member who is appointed by the local government. This person will oversee and coordinate all planning activities. He will utilize the help of assistant planners to facilitate greater detail and better perspective in the plan. However, limited budgeting, lack of persons available for planning, and the type of system itself will serve to decide the number of assistants that will be used.

2. The appointed contingency plan chief and assistants should make use of "Committee Meetings" in order to achieve the best plan input. Ideas may be generated by insuring that committee members come from a broad and knowledgeable range of people in the community. The committee should include water system staff, community officials from the fire, legal, and health departments, together with non-official representatives from pertinent local industry, communications systems, power companies, and contractors. Once the majority of these people have been identified (and have agreed to serve), local government should make all possible arrangements to allot time for committee meetings. This may mean time during regular system working hours or specially arranged times to accommodate the committee members. The sense of participation in the process is invaluable in gaining acceptance and knowledge of the contingnecy plan.

3. Resource materials are available to assist the committee. These documents are:

"Emergency Planning for Water Utility Management" (AWWA-M19), American Water Works Association.

"Public Water Supply Facilities, Emergency Preparedness Checklist," Public Health Service, U.S. Department of Health, Education and Welfare.

"Civil Defense Aspects of Waterworks Operations" (FG-F 3.6) Department of Defense.

F. Major Consideration in Contingency Plan Formulation

The contingency plan essentially will become an operation schedule to be followed in each particular emergency situation. The plan must be based only on the resources of the water system and not on idealized resources that the utility would like to acquire but doesn't actually possess. Only those outside resources which have been pre-arranged for delivery are valid for inclusion in the plan. The emergency operational plan, relative to each assumed emergency type, should be developed in the following steps:

1. Estimate the effect of the particular emergency causing event upon each major component of the system.

2. Estimate system capability to deliver potable water considering reductions as determined in item # 1.

3. Estimate community requirements for potable water under conditions imposed by the emergency situation and determine level of service which would be required.

4. Compare reduced system capabilities to community requirements and determine additional volumes of water required if a shortfall at the service level desired is apparent.

5. Establish priorities for use of available quantities of water.

6. Plan use of available water resources to meet requirements.

7. Assign specific work assignments to water system personnel and establish utilization of

outside services and/or auxiliary work forces as necessary.

Items 1 and 2 are in effect a vulnerability assessment of the system and system resources relative to each identifiable emergency creating cause. These two items should recognize applicable portions from the tabulation below:

a. Estimated characteristics of assumed disasters or stress conditions affecting the water system, directly or indirectly:
   - Civil Disturbances
   - Strikes
   - Vandalism
   - Floods
   - Droughts
   - Earthquakes
   - Tornadoes
   - Thunderstorms and high winds
   - Malfunction of portion of system
   - Indirect interruptions to supplies of vital materials or services

b. Determine effect of each single crisis upon each component of the water system, including outside sources of service or materials to estimate total volume of water available:
   - Water supply
   - Treatment facilities
   - Transmission/Distribution
   - System storage
   - Water personnel
   - Communications system(s)
   - Mutual-Aid agreements
   - Interconnections
   - Power supply
   - Materials and supplies

Items 3 and 4 deal with the estimation of the amount of potable water which would be required by the community at various times during the particular emergency assumed. A balance between community requirements at what is felt to be the minimum necessary level of service and the quantity of water available from the system as developed would indicate two alternatives:

quantity of water available from the system as developed would indicate two alternatives:

a. If excess of water available: advancement to a higher level of service;
   or
b. If deficiency of water available to meet minimal necessary level of service: the amounts of water which would have to be obtained from an alternate source of supply.

Item 5 deals with the pre-establishment of priorities for the disbursement of water available at the outset of the emergency and during the recovery period. This will permit the water utility to program the most beneficial utilization of water available. Important points for consideration include:

a. Minimum standards for water quality consistent with State and Federal requirements.
b. Establish the minimum level of service relative to the particular emergency tolerable from the viewpoint of public health and safety.
c. Establish maximum allowable time periods at a given level of service before it would be necessary to increase the level of service.

Item 6 is concerned with the determination as to the source or sources which must be utilized to deliver the amounts of potable water previously determined to be necessary. Major items for consideration are:

a. An analysis of all available sources of water, not just those utilized under conditions of normal operation. These sources might include both ground and surface water, public or private ponds, reservoirs, swimming pools, interconnections with other water utilities, water stored within building water systems (hot water tanks, etc.), water provided in bottles or tank trucks from outside sources of potable water or local dairies or bottling plants.
b. Procedures necessary for temporary treatment and emergency pumping of non-potable water sources with portable equipment.
c. Guidelines for rationing of potable water if required to enforce a given level of service. This might include a distribution system utilizing tank trucks dispensing water into containers provided by each consumer at a minimum level of service, isolation of various portions of the distribution system by selective valving, public orders as to purposes for which water might be used by individual customers, etc.

Item 7, assignment of personnel, when completed, would insure trained staff being available to perform all necessary tasks involved with the delivery of potable water at the required service level. Assignments must be layered so that no important function is left undone by the absence of

capability of the individual involved. Each person assigned a task or tasks should be trained to automatically perform his assigned function under the emergency condition with as many possible major decisions made in advance to insure the most efficient use of all available manpower. Important items connected with personnel include:

a. Establish table of organization with a clear delineation of responsibility and area of concern for each person.
b. Provide for protection of personnel during the course of an emergency. Items like food, housing and security must be considered especially if work to relieve the emergency must be accomplished on a twenty-four hour basis.
c. Determine the availability of other sources of personnel within the government of the community outside the water utility department and make assignments consistent with their abilities.
d. Initiate mutual aid agreements with surrounding communities, industries, contractors and related utilities. These agreements could provide for assistance in the form of personnel, equipment, money, or materials as required.
e. Provide for proper training of waterworks personnel, other personnel from within the community government staff, and outsiders such as volunteers and those furnished by related industries or contractors who are available during the emergency.

G. Partial Check List for Appraisal of Contingency Plans

1. Have all possible sources for water supply been considered?
2. Is each source tabulated as to potential quantity, quality, location and availability?
3. Have existing system deficiencies been identified and plans and schedules established for their elimination?
4. Will continuous communications be available during an emergency?
   a. Normal telephone service
   b. Mobile telephone service
   c. Radio
   d. Liaison with other required utility systems
5. Have personnel and facility security measures been established?
6. Are water conservation plans ready for implementation?
   a. Priority list
   b. Does your local government have the legal authority to restrict use of water by bans on non-essential uses and rationing?
   c. Is the water system designed to enforce restrictions of water usage by selective value operation?

d. Have alternate sources of water (potable or non-potable) been located for fire defense or industrial use? Such sources must be available where required without causing contamination of that portion of the distribution system necessary for potable water service.

7. Have sources of supply for construction, repair and replacement materials, which might be required in a given emergency situation, been located and their availability assured?
8. Has financing of the costs created by emergency situations been established? (Annual escrow of monies to be used only in emergency conditions?)
9. Are necessary documents safeguarded with copies available to all personnel concerned?
    a. Emergency Plan or applicable portions thereof.
    b. Engineering Drawings (preferably showing "as-built" conditions) showing details of all waterworks facilities.
    c. Current written operation and maintenance manuals.
    d. Resource lists including repair facilities, mutual aid participants, outside services and contractors, suppliers of vital equipment, parts and materials, etc.
    e. Emergency procedures based on the various assumptions of cause/effect.
    f. Current listing of trained personnel and their specific assignment(s) during emergency situations.
10. Are all persons required during a given emergency properly trained as to their specific functions?
11. Does the water system have a trained sanitary engineer on staff or otherwise available to assist in addressing the emergency?
12. Are exercises in emergency operations conducted to insure high levels of performance by all involved?
13. Does the plan include provisions for transport of potable water by means other than the distribution system?
    a. Tank trucks
    b. Temporary piping (above ground)
    c. Trucks and small containers
14. Are reserve supplies of chemicals, spare parts and other stockpiled materials sufficient for the various assumed emergencies?
15. Is emergency standby equipment available for emergency use and is such equipment well maintained, periodically tested and fully operable?
    a. Mobile or fixed auxiliary generators
    b. Mobile pumping equipment
    c. Portable treatment units or chlorinators

16. Is the source of electric power fully assured?
    a. Available substitute source
    b. Standby generators
    c. Engine driven pumps
    d. Reserves of fuel
    e. Security and other protection for generating equipment
17. Have emergency procedures been established for procurement of tools, equipment, materials and outside services by authorized water system personnel and understood by both staff and necessary vendors?
18. Are water system laboratory facilities sufficient for testing required during emergencies or have provisions been identified for the utilization of outside laboratory assistance?
19. Have mutual aid agreements been consummated?
    a. Assistance in: Water resources, Personnel, Materials, Equipment, Chemicals
    b. Exchange of personnel for on-the-job training and system familiarity
    c. Close liaison between mutual aid parties established and maintained.

H. Summary, Local Drinking Water Supply Contingency Plan

The custody of a drinking water supply contingency plan will provide each water utility with the ability to successfully combat an emergency situation with efficiency and at the least possible cost. Following the steps of a well-organized plan will least disrupt normal service to the system's customers and provide the highest degree of public health protection. The impact of the local plan will be felt by all water system staff during an emergency situation since the logical steps they should take to reduce the problem have been previously outlined for them, and major decision making under stress conditions is not required.

A feeling of confidence will be experienced by people who have such a plan available and who have been well-trained in its implementation. Merely knowing what one's job is, specifically whom to call on for whatever outside help is necessary under conditions of an emergency situation, and what steps should be taken in what sequence will create confidence. A drinking water supply contingency plan will identify existing soft spots throughout the system. These items alone make the preparation of the plan worthwhile since they will increase efficiency of normal operations even if emergency aspects are never required.

CHAPTER XI
COMMUNICATIONS

A. General

Communications, with reference to water supply emergency planning, has two completely different definitions. Communication in connection with the water system proper is concerned with the proper transmission of commands, requests, directions, etc., by and between water system personnel and others associated with the reduction of abnormal service conditions created by a disaster or emergency situation. Communication with respect to the general public and more particularly the customers of the water system, is involved with notifications, warnings and general information concerning the progress of an emergency situation involving the water system. This type of communicative effort is directed towards enlisting the cooperation of the citizenry and as an effort to answer questions, allays fears and prevent panic.

B. Water System Emergency Communications

During the progress of combating an emergency situation, it is essential that all personnel involved in the direction of or the actual prosecution of remedial work be in close contact with each other. Contact will allow the most efficient cooperation of all parties involved and lend speed to the execution of all required tasks. Those persons in charge will be kept up to date as to the recovery progress and will be able to base necessary decisions on current data.

Certain types of emergencies may negate the use of normal channels of communications; the telephone if such service is interrupted by downed lines etc. or some forms of radio communication if base situations utilizing regular power sources are the core of the system. Provisions need to be made for an efficient and fail-safe form of communication to be available during emergency conditions when the use of normal facilities may be denied by the crisis. The following list indicates several communications sources which might be useful in such situations:

1. Emergency battery power or generating equipment to power base-station types of radio facilities.
2. Mobile radio sets, battery powered, installed in all waterworks vehicles and at emergency command posts. These radios should be compatible (as to operating frequency) with local fire department, sheriff's department, police, and other departments of local government such as health and engineering.
3. Citizens Band Radio equipment installed in vehicles or use of local REACT organization to assist the waterworks in communications.
4. Local amateur radio operations for contacts with their counterparts in other commu-

nities from which assistance is desired.

5. Utilization of radio equipment carried by local or State police vehicles and those operated by the Sheriff's department. In the event of a major disaster, this equipment may not be available to the waterworks as the law enforcement agencies may be performing other community services.
6. The Iowa DNR maintains mobile radios in some of their vehicles. The presence of an Iowa DNR radio-equipped vehicle at the site of the water system emergency could permit direct contact with Iowa DNR Central Office or the appropriate Regional Office.

C. Communications with the Public

Prompt transmission of information relative to the status of the water system following the onset of an emergency is needed to prevent public confusion, doubts, misinformation, or outright panic. Properly executed items of formation which assure the public of the utility's ability, through prior planning, to cope with emergency conditions will help prepare for the day when an actual crisis strikes. Requests, suggestions, recommendations, as well as outright orders are often needed to be brought to the public's attention to safeguard health or prevent a critical situation from getting worse.

Rapid contact may be established with the citizenry through several media. Some of these which should be considered by the water system are:

1. Commercial Radio Stations
2. Commercial or Educational Television Stations
3. Newspapers with local distribution
4. Bulletin boards in libraries, post offices, etc.
5. Sound trucks
6. Recordings utilized with answering service and/or water utility telephone number
7. Public information bulletins
8. News letter published by utility and enclosed with monthly or quarterly billing

Liaison must be established between the water system and local government and the various media to be sure that important notices, press releases, etc., will be accepted and passed on to the public. Obviously, this needs to be accomplished well in advance of the time the communication becomes necessary. It is necessary to get the names of those authorized to provide information for publication or release with the various media. There must be a mutual understanding between the utility, the local government, and the media as to the problems which might be involved, their extreme importance relative to public health and safety, and the types of information suitable for public release.

Public notification in connection with a given emergency will serve to accomplish the following items:

1. Inform the public as to the nature and duration of the emergency.
2. Define the geographical extent of the area effected.
3. Set required limits on consumption of water if necessary.
4. Alert the populace as to possible disinfection procedures required for drinking water in the case of system contamination.
5. Establish locations for alternate supplies of potable water together with limits of each distribution area. Inform public as to necessity of providing containers if needed.
6. Provide sources of more detailed information.
7. Air information as to the process of recovery, progress reports and amended recovery schedules.
8 Provide data relative to potable water stored within individual homes, water heaters, ice cubes, and other such sources. This includes warnings to turn off heat sources for hot water tanks in the event of system depressurization.
9. Present a factual picture as to the circumstances contributing to the crisis and a conservative estimate as to the effects of the emergency on the public as well as commercial and industrial facilities. Such information will tend to reduce the effect of rumors.

Pre-emergency information regarding the ability of the utility to combat a crisis situation is an important public relations tool. Professional help is an asset in the production of this material. The American Water Works Association has information available for purchase in bulk lots which may prove useful.

Emergency notification of the public and effected businesses needs to be accomplished rapidly and must involve all possible media to be sure of the widest possible distribution. Local radio and television stations should be given first consideration due to the rapidity with which news can be disseminated by these media. Local newspapers should receive news releases at the same time they are provided to the radio and TV facilities; however, actual time of publication of the items will depend on the papers deadline. Notices posted on bulletin boards and the use of sound trucks will provide information quickly to those persons not immediately exposed to the other media. Recordings describing much of the available up-to-date information, may be used in connection with the water system's normal telephone service.

Four types of news releases should be used to notify and get the cooperation of the general public during a crisis situation and the recovery therefrom. These four types are the initial notice, the

progress report, the explanatory news release, and the all clear at the end of the emergency. All types of releases should be submitted to the station manager of radio/TV outlets, the managing editor of a local newspaper, etc., only by those persons previously identified and authorized to make such releases. This pre-authorization is necessary if the news is to be released immediately without having to check on the validity of the information.

The initial notice should be brief, factual, and not overly alarming, and should include specifics on the nature of the emergency, its expected duration, level of water service which is available, necessity for home disinfection of drinking water, the extent of the service area effected, and sources to contact for more detailed information. If time is of the essence in alerting the public, some of the data may not be immediately available. The news release should be filed as rapidly as possible to reduce adverse effects upon public health and safety. Missing information can (and must) be provided in subsequent news releases.

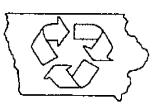
Progress reports should be issued at regular intervals as the recovery stage begins. These reports may contain information relative to time schedules, revisions in effected areas or requirements as to quantity and purpose of permitted water usage, disinfection requirements, location of alternate sources of drinking water, repair progress, appeals for volunteer labor or specialty trades and services, etc. These reports will update the public and will help assure their cooperation in water conservation efforts.

The explanatory type of news release will contain full details as to the effect of the particular crisis condition, types of remedial repairs which have been undertaken and why, thank the public for their cooperation, explain the usage of outside services or agencies, and possibly have statements by local health authorities.

Typical news releases, especially those giving initial notice of "boil water" or water conservation orders should be prepared in advance to insure their early publication when the emergency strikes. The list of persons pre-authorized to prepare and release such news items should be layered to insure that at least one person will always be available and have the authority to cause prompt publication. The proper preparation of these news releases may require the cooperative efforts of governmental staff (Mayor, City Manager), water system personnel (Manager, Service Director, Engineer), together with representatives from the local health authority. Assistance may also be available from local media persons. Having typical press releases ready when the emergency strikes may save hours of time and could prevent serious health problems relative to the community. In summary, good and thorough communication will assure a smoother path to recovery and enhanced customer relations whatever the nature of the emergency event.

D. Conclusion

The purpose of this document is to enable a local utility or local government body to put together an individualized site-specific emergency plan. Each subsection contains a number of ideas a local supply could use to protect their drinking water source. Suggestions within this document can be incorporated into a local program, and different, innovative ideas are encouraged. A water supply has a great deal of flexibility in developing an overall plan. If you have questions regarding the creation of a contingency/ emergency plan after reading through this document and evaluating your own water source/s, contact the IDNR at 515/725-0275.



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